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H. D FARGO, President and Treasurer
S. R. EDWARDS, Editor and Secretary
H. D. FARGO, Jr., Vice-President and Advertising Manager
D. C. SORENSEN, Western Advertising Manager

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"Telephony's" Review of the Year

Survey of Events and Developments of 1927 in Telephone Industry—Extension of Long Distance Servic in All Parts of the World Most Noticeable Development—Trends and Influences Which Stand Out as Indicating Future

By Stanley R. Edwards

Looking back over 1927 and considering and weighing the various events, it may well be said that the year was one of material progress in the telephone field. Conditions as a whole show a distinct improvement over those prevailing a year ago, and there is a decidedly better feeling, a more optimistic tone, among all engaged in the industry.

Long Distance Communication.

Of all the progress made during the year, that achieved in the extension of long distance communication and service stands out prominently. Of course, the opening of transatlantic telephone service, as a link between the old World and the new World, was the outstanding event.

From all parts of the world come reports of extension of long distance telephone service, indicating the drawing together of the cities of different countries and bringing together the capitals of those countries, so that in cases of emergency conferences may be held quickly between ruling officials —an augury for world good will.

Number of Telephones.

There has been a steady increase in the number of telephones served by the various companies in this country, the growth being at the rate of about 5 per cent in the larger centers. As the year closes, there are, conservatively estimated, 18,650,000 telephones in this country, an increase of about 850,000 during the year. Approximately 2,850,000 of the total telephones are served from dial system central offices.

Special efforts were made to increase revenues through increasing the number of patrons and promoting greater use of service. In some companies attention was given to obtaining new subscribers and in other cases campaigns have been put on for selling extension telephones. Developing of more toll business, particularly when the companies own their own toll lines between various centers, was another activity in the production of greater revenues from operation.

The developing of new business is necessarily dependent upon good service. That this is recognized is seen in the efforts which have been put forth in improving the plant and equipment. Many new buildings have been erected, switchboards installed and the outside plants rehabilitated. In other cases, simplified and improved methods of handling traffic and maintenance have been inaugurated.

The discussions at the various conventions have all indicated the increased interest taken in the many problems relating to local management and operation. The attendance at all conventions during the year set new records and demonstrated the direct interest of executives and department heads.

Reduction of operating costs and increased utilization of facilities for greater revenues is the continuing goal of operating executives.

The Buying Movement.

The great activity in the purchasing of telephone properties by various interests, many of whom had not been previously engaged in the telephone business, continued during the year. There has, however, been a stabilizing influence at work in recent months. There appears to be some trend in the grouping of the many purchases of small properties into operating units, and operating organizations are taking shape looking to more efficient handling of the different groups.

Another tendency that appeared in the later months of the year is the selling of properties of some of the newcomers to established operating organizations. This may be a sign that some of the so-called investment houses are becoming convinced that there are no great speculative profits in the telephone business, and are therefore getting out before they become more seriously involved.

Bell's Policy and Purpose.

Speaking before the annual convention of the National Association of Railroad &

Utility Commissioners in October, Walter S. Gifford, president of the American Telephone & Telegraph Co., said: "There is not only no incentive, but it would be contrary to sound policy for the management to earn speculative or large profits for distribution as 'melons' or extra dividends."

The policy and purpose of the Bell company was stated to be "the most telephone service and the best, at the least cost to the public."

"Earnings," he said, "must be sufficient to assure the best possible telephone service at all times and to assure the continued financial integrity of the business.

"Earnings that are less than adequate must result in telephone service that is something less than the best possible. Earnings in excess of these requirements must either be spent for the enlargement and improvement of the service furnished, or the rates charged for the service must be reduced. This is fundamental in the policy of the management."

Bell Following Its Policy and Purpose.

About a month later announcement was made of a reduction in long distance rates applying to points 400 miles or more distant. It is estimated that the new schedule will result in a saving of $1,500,000 annually to telephone users.

The reductions in charges are intended to encourage even greater use of the Bell system's nation-wide network of wires and to pass on to long distance users the economies made possible by recent scientific developments. These developments are applicable chiefly to communication over longer distances and include the growth and improvements in practically weatherproof cables, and the more general application of such devices as vacuum tube repeaters, loading coils and carrier equipment.

Increased long distance business as a result of the reduction of rates is anticipated and this increase in business is expected to engage the longer circuits more fully, thereby rendering their operation more efficient.

Western Electric Dividend.

Of the special dividend of $50,000,000 declared by directors of the Western Electric Co. on December 13—one of the largest cash dividends ever declared in the history of American industry—more than $48,000,000 went to the American Telephone & Telegraph Co.

This dividend, it was stated, was earned over a period of many years in fields of activity outside of the Bell system, and would be added to the surplus of the parent company and ultimately invested in telephone plants.

"It will, therefore, be an aid in keeping down the cost of telephone service," said President Gifford of the American Telephene & Telegraph Co., in a statement given to New York newspapers. "This is in accordance with the policy of the American Telephone & Telegraph Co. to pay only regular dividends, and to use any earnings beyond this requirement, from whatever source received, either to enlarge and improve telephone service or to keep down its cost."

Cases Before Commissions.

The cases before commissions were apparently evenly divided between matters of rates and financing and approval of mergers. While the commissions, in most cases, could not cut down purchase price values, they could specify rates based upon plant valuation figures without regard to capitalization of companies.

Commissions generally have recognized that the average Independent company really required the modest increases of rates applied for and, in most cases, granted them.

The Bell Telephone Co. of Canada was given an increase approximating two million dollars yearly, in place of the 2¾ million dollars sought. This increase was appealed by a number of the cities involved, but the appeal was not granted.

In Virginia, the Chesapeake & Potomac company was given an increase of $200,000 a year in place of the $775,000 the company desired.

The investigation of the Ohio Bell company continued during the year, the attorney general of the state taking an interest in it about the middle of the year and employing an expert to check over the valuations of both the company and the commission. Hearings were resumed the middle of this month.

In New York, the master-in-chancery continued the taking of testimony in the case involving the commission's order of 1924.

A new case, which as the year closed, is before the California commission, relates to the application of the Pacific Telephone & Telegraph Co. for increases in the so-called Bay district of San Francisco. As this month ended, the various cities filed an application to the commission, alleging the existing rates excessive and unreasonable and requesting the commission to investigate them.

The complaint which the city of Boston filed with the Interstate Commerce Commission against the New England Telephone & Telegraph Co. and the American Telephone & Telegraph Co. was dismissed by the commission for a lack of prosecution by the Boston officials.

Interstate Commission and Depreciation.

The matter of depreciation received a great deal of attention during the year, particularly in the Independent group. The operation of the Interstate Commerce Commission's order as to depreciation was suspended in order that consideration might be given to objections raised by the Independent interests.

Hearings were scheduled for last month but, owing to matters relating to the valuation of the railroads, they were postponed until next month. Throughout the field generally, there is a much better understanding of the importance of depreciation than a year ago.

Public and Employe Relations.

The matter of public relations and employes' relations during the year received continued attention. Meetings of employes with company executives discussed the subscriber's service, and means of improving

COMING CONVENTIONS.

South Dakota Telephone Association, Huron, Marvin Hughitt Hotel, January 10, 11 and 12.

Arkansas Telephone Association, Little Rock, Hotel Marion, January 16 and 17.

Nebraska Telephone Association, Kearney, Ft. Kearney Hotel, January 17, 18 and 19.

Minnesota Telephone Association, Minneapolis, Radisson Hotel, January 24, 25 and 26.

North Dakota Telephone Association, March 6, 7 and 8.

Oklahoma Utilities Association, Tulsa, Mayo Hotel, March 13, 14 and 15.

Texas Independent Telephone Association, Fort Worth, Texas Hotel, March 20, 21, 22 and 23.

Ohio Independent Telephone Association, Columbus, Deshler-Wallick Hotel, April 11, 12 and 13.

Up-State Telephone Association of New York, Powers Hotel, Rochester, May 23, 24 and 25.

it, efforts being made to view the matter from the subscriber's point of view.

The various Bell companies, as an addition to their employes' thrift program, provided a plan whereby employes could take out insurance policies with well-known, established companies, the premiums on the policies to be paid through salary or wage deductions. The employes under this plan obtained any form of life insurance up to $10,000 without medical examination.

A number of companies in the Independent group also made similar arrangements. The number of employes taking advantage of this opportunity is gradually increasing from month to month.

Independent and Bell Groups.

The relations between the Independent and Bell groups have continued harmonious. Several conferences have been held during the year and various questions discussed.

As a result of the discussions during these conferences the representatives of the Bell group have obtained a most illuminating picture of the Independent group and its organization. It is believed that the Bell organization now has a better and more comprehensive understanding of the Independent industry than at any previous time.

The relation of the various companies making up the group to one another and the group as a whole has been definitely pictured, and the consequences of removing any of the units from the group have been carefully pointed out.

Practical Demonstration of Television.

For many years, television has been talked of and dreamed about. In April last it was publicly demonstrated as a feasible proposition. Circuits were set up between New York and Washington and "face-to-face" conversations over telephone wires took place between President Gifford of the American Telephone & Telegraph Co. in New York City and Secretary Hoover in Washington. Others also took part in these television conversations, after which the New York television equipment was connected to radio receiving equipment and an entertainment program was transmitted by radio from the American Telephone & Telegraph Co.'s experimental wireless station at Whippany, N. J.

This was the first public demonstration of television and reports of it stirred the public imagination throughout the country. The equipment, however, is stated to be a long way from commercial form, but is being developed as rapidly as possible in the laboratories.

Telephotographic Service.

The use of long distance telephone wires for the transmission of pictures, first established as a commercial service a few years ago, was extended during the year by the establishment of stations for the transmission and reception of pictures by wire at Atlanta, Ga., Los Angeles, Calif., and St. Louis, Mo.

The service had already been in successful operation on lines connecting Boston, New York, Cleveland, Chicago and San Francisco, so that the addition of these three cities makes eight in all at which this service is regularly in operation.

Facilities for the quick transmission of pictures over long distances by this process have proved of value, not only for newspaper use, but also for sending facsimiles of documents, signatures, thumb prints, proofs of financial and other advertisements.

Telephone and Broadcasting.

Radio broadcasting makes extensive use of telephone circuits for connecting widely separated stations so that a single program may be broadcast simultaneously from an extensive chain of stations. The greatest number of stations so linked together during the year numbered 75 on September 21, when addresses delivered at the Radio Industries banquet in New York City were broadcast.

A new system of program service was announced in the fall, which is believed points the way for a large development in that service by telephone companies. It is popularly known as "wired radio," and is based on the invention of General George Squier. It permits telephone conversations on the same wires simultaneously with the program.

A specially-constructed receiver is connected to the telephone wires already installed in a residence, and the reception of the radio program does not interfere with the use of the telephone. This is done by using so-called inaudible frequencies for program sending. Those frequencies are electric waves which oscillate so rapidly that the human ear will not pick them up until they are changed to audible frequencies. This is accomplished by a comparatively simple receiver in the subscriber's residence.

All the receiving equipment for this new system of program distributions will be installed and serviced by local telephone companies. Also, it will be the telephone company's job to keep the receiving equipment in continuous service at no cost to the consumer other than the regular monthly service fee.

The preliminary testing and experimental work on this new system of program service have been carried on in Freeport, Ill., by the Kellogg Switchboard & Supply Co. Freeport is a prosperous city of 25,000, located 125 miles west of Chicago. All the details for the program service have been perfected and installation of the equipment is now going forward in Freeport homes.

Long Distance Service.

The expansion in the use of long distance service shows that the business interests of the country are coming more and more to rely upon the telephone for the transaction of business which formerly necessitated trips consuming much time, to say nothing of the expense involved.

A third long distance telephone line, known as the "Northern Transcontinental line," was opened early in the year. It connects Minneapolis with Spokane, Seattle and Portland, Ore.

Facilities for communication across the northern boundary of the country were augmented by the establishment of a direct connection between the lines of the Bell system in the United States and the telephone system of Saskatchewan, Canada. New open-wire lines connecting Bismarck, N. D., and Regina, Saskatchewan's capital city, completed the work begun years ago of connecting the Bell system directly with all the more important Canadian telephone systems.

Toll Cable Lines.

The work of constructing long distance cable lines, which are practically stormproof, was vigorously advanced during 1927. Early in September a cable was completed between New York City and Cleveland, Ohio, by way of Albany and Buffalo. This makes it possible to give service between New York and Cleveland over either one of two separate cable routes, which practically assures continuous service at all times.

The cable route between New York and Cleveland extends through Pittsburgh and has been in service since 1923. Facilities

for the simultaneous transmission of 250 telephone conversations, and at least as many telegraphic messages, will be provided by this new cable when utilized to capacity. Although only 2⅝ inches in diameter, the cable, which is 649 miles long, contains 315,000 miles of wire. It weighs 26,225,000 pounds.

In November, the toll cable construction south of Washington, in the direction of Atlanta, was completed through to Petersburg, Va. With the completion of this construction, it will now be possible to transmit a telephone message through cable all the way from Portland, Me., to Petersburg, Va., in the South, Milwaukee, Wis., in the Northwest and St. Louis, Mo., in the West.

Carrier Current Systems.

Along with the extension of long distance service has been the use of carrier circuits. About 30 of these systems were in commercial use at the end of the year on short-haul toll telephone lines. By use of the carrier current system, it is possible to increase very substantially the message capacity of circuits of certain length.

An interesting economical use of these systems is their installation between points where existing facilities are sufficient to handle business for, say, nine months of the year, but entirely inadequate for the other three months, such as happens in the case of summer and winter resorts. The carrier current system can be applied to the existing toll lines for the busy season and then the equipment transferred to another section of the country, where its temporary use is required.

"Direct" Toll Circuits.

The use of toll service has been increased greatly through the faster service that is now provided by means of direct circuits. A circuit, when placed in service to connect two toll points permanently, is known as a "direct route" or circuit.

There are now many of these direct routes between cities separated by comparatively short distances, and also a number of long ones; for instance, during the year direct circuits were established between New York and St. Louis, Mo., and between New York and Tampa, Fla.

Two direct circuits, 3,273 miles in length, the longest in the Bell system, extending between New York City and Los Angeles, were opened for service December 21. Calls between these points are now being completed between the Atlantic and Pacific coasts, with the assistance of the New York and the Los Angeles operators only.

Repeaters have been installed at seven points between New York and St. Louis, and between St. Louis and Los Angeles the new direct circuits are fed by the repeaters of the Southern transcontinental line.

A Million Dollar Prize Unclaimed.

The successful use of repeaters recalls to mind the offer made 28 years ago of a million dollars for a telephone repeater. This offer was made by Charles J. Glidden, who died September 11, 1927. Mr. Glidden was a pioneer Bell man, active from 1876 to 1902, and at one time he owned one-sixth of the Bell telephone system in the United States. At the time the million dollar offer was made, Mr. Glidden was president of the Erie Bell telephone system. He is quoted in the Electrical World and Engineer of June 24, 1899, as follows:

"The long distance service now reaches to Galveston, Texas, in the Southwest; Grafton, N. D., in the Northwest; New Orleans in the South, and the extreme northeastern sections of Maine. The extreme points have not yet been put into commercial connection with each other, the direct use at present being confined to distances of from 1,500 to 1,800 miles.

I think the capacity of the No. 8 copper metallic circuits now in use is about 2,000 miles. A capacity which would permit of a direct connection between here and San Francisco would require copper wire at least as large as an ordinary broom handle. In the present circumstances I cannot see where there is room for any phenomenal developments in the telephone system.

Now, if someone would invent a telephone repeater corresponding to the telegraph repeater, or a telephone quadruplex corresponding to the telegraph quadruplex, it would revolutionize our business and cut the charges in two for long distance service. Copper wires would not be necessary then and the reduction of the cost of maintaining the lines would be enormous.

I will give $1,000,000 for either one of these inventions."

"From the earliest days of telephony," the Electrical World and Engineer says editorially, in commenting on this offer, "the great inventive prize in that field has been the telephone repeater, and therefore those who would now undertake to gain it should realize that they follow many able inventors whose efforts have been futile.

"As early as 1878 Professor Hughes thought he had solved the problem of telephone relaying, and Edison at one period gave the subject much attention, taking out a number of patents. Professors Thomson and Houston, Gilliland, Farmer, Bennett, Patten and about two score other men figure in the patent records as seekers after the prize. It may, therefore, be taken for granted that the solution of the problem—if solution there be—will be one not involving merely obvious combination of telephone elements, but most probably lying in a direction not yet explored nor even yet discovered."

"The repeater," reads a recent statement of one of the Bell companies, "is a device used on long distance telephone circuits to amplify the electrical currents set up by the voice as they become weakened in traveling great distances along the telephone wires. The repeater is built upon the same principle of amplification as a radio amplifier, but has two bulbs instead of one, thus enabling the voice currents to travel in two directions instead of one as in the case of a single radio amplifier. The repeater thus produces clear transmission of the voice by a process of rejuvenation.

"The telephone repeater is one of the many inventions and improvements perfected in the Bell laboratories and has made long distance conversation not only practicable but economical."

Service Developments.

Approximately 5,000,000 miles of telephone wire were placed in service during the year, and it is now estimated that there are more than 63,000,000 miles of wire in operation in the telephone system of the United States.

There was a marked increase in the volume of telephone traffic. For the year as a whole the companies in this country transmitted an average of 72,500,000 conversations daily. This represents an increase of approximately 2,500,000 over the average number of conversations per day in the preceding year.

The number of telephone workers showed an increase of about 6,000 during the year and now amounts to around 375,000. This does not include workers in the telephone manufacturing and supply field, who number about 50,000.

Improvements in operating methods, and in some places rearrangements of equipment, made it possible to dispense in many cases, with some of the steps that were formerly necessary in handling toll traffic at special toll boards. A larger majority of the short-haul calls are being completed at the local switchboards.

The speed of service on toll board traffic increased from an average of 6½ minutes

in 1925 to an average of 2½ minutes in 1927. This is the average time between the receipt of the call by the toll operator and the establishment of the connection or the giving of a report to the person placing the call.

In connection with service developments, the announcement of the various Bell companies last spring that the so-called European type sets, or cradle type telephone, could be obtained by subscribers desiring them upon payment of an additional charge per month was of interest. This type of set had been available to subscribers of Independent companies for some time previous. A charge of 50 cents per month additional was approved by a number of the commissions. This higher rental the public seems willing to pay because of the convenience and attractive appearance of this type of instrument.

The use of the phrase "Thank you" by operators was extended during the year, and it is now quite a universal practice throughout the country.

Another development late in the year was the filing with the Washington Department of Public Works of petitions from telephone subscribers in a number of communities in the state, requesting the commission to order installation of the telechronometer system of measured service.

This type of measured service has been in operation in Everett, Wash., for about a year, and is understood to be working out quite satisfactorily to both the company and the subscribers. Telephone service by this system is metered somewhat like electric light, gas and water service.

The Small Exchange.

In connection with the organization of the smaller exchanges into groups or systems of various kinds, there has been a great deal of attention paid to the more efficient operation of these small exchanges.

In some cases, the so-called agency system of operation has been established with the board located in a private home and operated by the folks residing there. A widow with one or two daughters is considered a desirable combination. The maintenance and trouble is looked after by the maintenance man from the adjacent exchange or operating center.

In other cases the exchange has been closed and the subscriber served over party lines from a nearby exchange.

In still other cases the so-called semi-automatic type of exchange has been installed. In this type of exchange, standard automatic switches are used. The connection, however, is not set up by the dialing of the telephone user, but by an operator at a convenient operating center. It is stated that it is possible with this type of operation for one or two operators at an operating center to take care of all the exchanges of a network.

Various types of these semi-automatic exchanges have been developed to cover the different conditions of small exchange operation. Some employ existing magneto telephones, the apparatus being remotely controlled by a distant operator over one operating trunk. Others are arranged for central battery remote control operation, using existing central battery telephones. All of these schemes are fully worked out and have been practically applied.

World's Activity in Long Distance.

The expansion of long distance facilities was not confined to the United States alone. It was world-wide, in fact. International telephone service was inaugurated on September 29 between the United States and Mexico. On November 29, commercial service was opened between Mexico City and Montreal, Canada, the circuits covering a total distance of 3,381 miles.

The transatlantic telephone service, which from its first opening early in January between New York and London, had gradually been extended to all parts of the United States, Cuba and eastern Canada and England, Scotland and Wales, was extended to Stockholm, Sweden, on November 29. It will probably be extended to other European capitals during the coming year.

Already London has established service with these capitals, much of it being inaugurated during 1927. There were eight London overseas services inaugurated in the year. The opening on October 1 of service between London and Oslo, Norway, was said to have completed the linking of London with the capitals of Europe.

In Great Britain expansion of telephone service went forward, although not as rapidly, according to press reports, as had been expected. The present rate of growth in Great Britain is 120,000 yearly. In London the first exchange of the automatic type was cut into service in November.

On December 1 considerable reductions in toll rates became effective on calls between Great Britain and the Netherlands, Germany, Danzig, Sweden, Norway and Denmark. The London-Oslo, Norway, and the London-Copenhagen, Denmark, services on December 1 were extended to cover the whole of Great Britain, and the Anglo-Swedish service to all of Sweden.

The line between Paris and Stockholm, Sweden, 2,200 kilometers (1,370 miles) in length, placed in service June 5, was said to be the longest direct line in Europe. However, a line was opened November 9, according to Economic Life, Moscow, between Leningrad and Baku, Russia, which is 3,862 kilometers (2,400 miles) in length.

In China, a long distance line is being built between Nanking and the cities along the Shanghai-Nanking Railway.

In Japan, an extensive toll cable system is under construction that will rank well with other systems of the world. Its total mileage will be about 1,600 kilometers (995 miles). The final link will be completed in 1928, it is expected.

The opening of transatlantic radio telephone service stimulated experiments in extending this form of communication. Marconi announced sending of telephone messages by his beam system of wireless to Canada and his expectation of soon superimposing an efficient wireless telephone service on the beam now radiating to most parts of the British Empire.

By use of short wave wireless equipment, parties in Berlin, Germany, telephoned messages to Buenos Aires, a distance of about 7,000 miles. As there was no sending equipment in Buenos Aires, transmission was in one direction only.

These instances of the extension of long distance telephone service in various countries of the world indicate the trend towards drawing the countries closer together commercially and in other ways, and also the gradual expansion and extension of local service in the different parts of the world.

International Radiotelegraph Conference.

Representatives of 80 nations participated in the International Radiotelegraph Conference held in Washington during October and November. With so many countries and varied interests, there was abundant opportunity for disagreements.

At the very start of the conference, a difficulty arose occasioned by the fact that in the United States radio as an art and an enterprise is in private hands, while in nearly all other nations it is under rigid government control.

This obstacle to agreement was surmounted, and all other differences of viewpoint were harmonized after they had been

debated in a scientific spirit of 150 committees whose deliberations were spread over seven weeks. As Secretary Hoover said, in his admirable summary of the accomplishments of the conference, over which he presided, the treaty in which its proceedings culminated sets another milestone in the progress of international relations.

Some Results of Research Investigation.

During 1927, loading coils for use in local exchange and toll cables employing the new supermagnetic material, "permalloy," in their cores were produced. "Permalloy" is an alloy of iron and nickel which was developed a few years ago by the Bell Telephone Laboratories, Inc.

One of the first uses of this new material was for loading transatlantic telegraph cables, but the forms in which the metal was used for this and other purposes were wholly unsuited for loading coils. It is a material requiring special heat treatment and when prepared in accordance with the manufacturing methods which have been developed, its high magnetic properties render it valuable for use in the construction of loading coils.

In the research field a number of important discoveries were made which undoubtedly will have considerable influence on the design of apparatus in future years. Some of the investigators and their work may be briefly mentioned as follows:

Dr. L. W. McKeehan developed the theory of circular rotation of molecular activity as proved in the magnetization of permalloy.

Dr. J. B. Johnson discovered that every electrical conductor is a spontaneous generator of electricity. This clears up the trouble of thermal agitation of conductors. It finds practical application in amplification of electrical currents.

Dr. C. J. Davisson in investigating crystals found that electrons obeyed the laws of waves. The electron, he believes, is a group of electric waves which move together and are seen as a material body. Thus the theory that an electron is not a concrete body, but an electric wave.

Automatic System, Berlin, Germany

Some of the Engineering and Operating Problems of Automatic Installation in Berlin with 434,000 Telephone Subscribers—Methods of Handling Subscribers—Building Program Contemplates Entire Automatic Operation by 1942

By Hans Raettig,

Telegraphen Director, Berlin, Germany.

The city of Berlin has about 4,000,000 inhabitants and covers an area of 340 square miles. On July 1, 1927, there were working 434,000 subscribers' stations, the number of lines was 254,000 distributed over 48 offices of various ages and designs. The density is, therefore, one station per 9.3 inhabitants.

Each Conversation Is Metered.

Inside of the Berlin area in 1922 the first automatic office was erected in Zehlendorf (Fig. 1, Zdf. district G), with 2,400 lines, built by Siemens & Halske, Berlin, but the real beginning of automatic operation was April 23, 1927, when the nine tandems started to give service, as will be described later on.

Preliminary Development.

At the time of the cutover of Zehlendorf (1922), the layout of the telephone system for Greater Berlin was not yet finished. This first office was a unit for full automatic internal service with four-figure subscribers' numbers. To call any number in Berlin, the Zehlendorf subscriber dialed "0," thus reaching a single cord at an "A" operator's position located at Steglitz (Fig. 1, St. in District G).

Calls from Berlin to Zehlendorf were transferred by the "A" operator to semi-automatic "B" positions located at Steglitz. By the way, it may be mentioned that these "B" operators also handled the traffic from Berlin to the automatic office of Potsdam and its suboffices (outside of the Berlin area) which had been installed some years before.

Spandau (Fig. 1, Sp. District C) was automatized in 1926 with 3,000 lines; also a four-figure system to start with and an operation like Zehlendorf. These offices did not call each other automatically.

Meanwhile the definite layout of Berlin was finished and Lichterfelde (initial capacity 5,800 lines), Wannsee (1,600 lines) and Breitenbach (2,000 lines) were equipped with six-figure systems and opened on August 21, 1926. To start with, the traffic to Berlin was handled by an "A" operator in Steglitz and the traffic from Berlin was handled by "B" operators at Stephan (Fig. 1, Stph. in District G). Connections between the three offices were treated like the calls incoming from Berlin.

Principles of Ultimate Layout of Berlin.

The area of Greater Berlin comprises (July, 1927) 48 offices for local traffic with 254,000 lines and 434,000 subscribers'

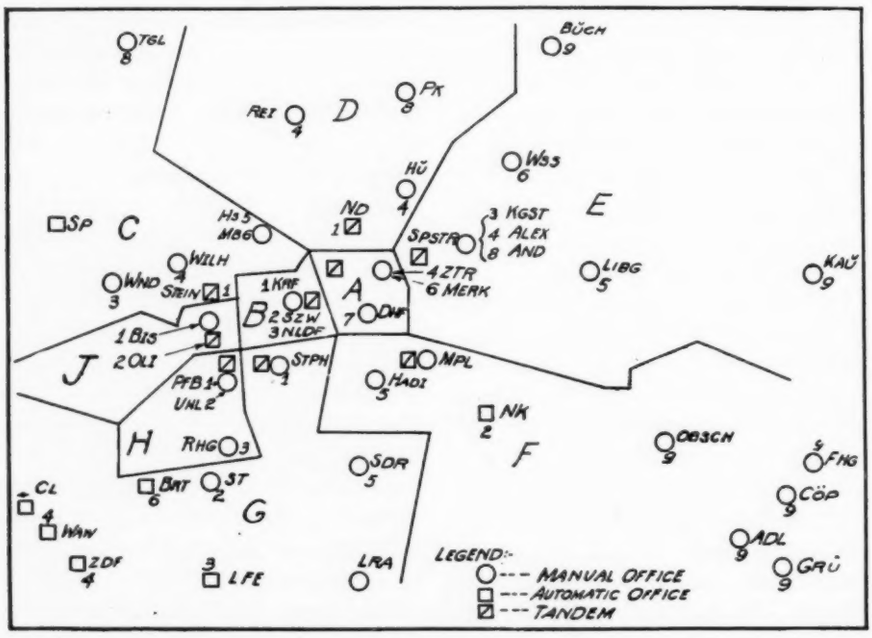


Fig. 1. Districts of Berlin Showing Location of Telephone Offices.

stations. The automatic system consists of 10-point rotary primary line switches, 15-point rotary secondary line switches; the numerical switches are, altogether, 10 vertical and 10 rotary step-by-step switches. The circuits show the direct impulsing from the dial to the switches, no translation being used.

In manual practice, the 10,000-line unit was found by experience to be the most suitable size of office. It is an advantage that the 10,000 units fit so well into the decadol numbering scheme. The 10,000 unit, however, does not restrict the capacity of an exchange building to 10,000 lines, and so several of the downtown exchanges will contain two or three 10,000 units.

At the outskirts, a 10,000-line office is too large, so the various 1,000-line groups of a 10,000-unit are separately installed and organized as sub-offices of the "Main Office" of the 10,000-unit. In some cases, sub-offices of a few hundred lines are branched out, e. g., Cladow, which is separated from Wannsee by the river Havel of two miles' width. So the 10,000 unit is the operative unit of the system of Berlin.

Districts.

The type of switches used allow the distribution of the traffic units in 10 differently numbered directions. A group of 10 "units" (together, 100,000 lines) form a "district" ("Bezirk"). It is not expected that any one district will grow beyond this capacity, but the insertion of additional units would cause no difficulty.

The new units would be numbered with three-figure codes as we shall presently see, thus increasing the capacity of any district to any figure, without renumbering existing lines.

The first selector would give access to 10 directions. The German Post Office, however, standardized the zero, "0," for special services—long distance, suburban, police, fire, etc.

Berlin is, therefore, divided into nine districts, Fig. 1, numbered *A, B, C, D, E, F, G, H* and *I*. These letters are printed on the escutcheon plate, holding the dial. The holes of the dial show only the figures 1, 2 . . . 0 in the well-known manner. The districts, *A* and *B*, contain the busiest downtown offices, and they form a kind of kernel. The other seven districts radiate to the outside like sectors of a circle.

Numbering Scheme.

The desired 10,000 unit is selected by a two-figure code, the first digit being a letter (*A, B, C*, . . .) the second, a figure (1, 2 . . . 0). Then the four figures of the subscriber's number follow, no party line code being used; in Germany, party lines have never been used for local traffic.

As a help for the memory, each office keeps its name and new offices (e. g., "Breitenbach") will get an office name. The present directory shows the numbers in this shape: "G 3 Lichterfelde 1355," or "C 7 Spandau 2783." In the future, after an unexpected growth, a number might be "B 81 Dahlem 2839."

For full automatic service the office name is unnecessary, but the names are required during the transfer period. After the cut-over to full automatic service in the total area, the office names will be preserved as a help for the memory, because a number "Neukoelln 1732" is easier to remember than F7-1732. Next to each station a little card will be fastened like Fig. 2, giving the code figures for the various office names. The office names are also more convenient for telephonic transmission, especially for the long distance operation.

This card makes it easy to keep the telephone users informed of which offices have been cut over. The names of the automatic offices are underlined, see Fig. 2. When an office is cut over, the newspapers and direct Information request the subscribers to underline the name; also the troublemen will keep an eye on it.

Finally the incoming junctions will be provided with an alarm so that a subscriber dialing only the code-number attracts the attention of special supervisors who will inform him how to proceed.

Administration.

Up to the spring of 1926, 24 managers were in charge of the operation of the Berlin system. To adapt the administration to automatic operation, ultimately nine district managers will be in charge, but at present some of the smaller districts are combined under one manager.

Line Plant of Ultimate Layout.

The layout of the line plant for a minimum of copper is difficult to make. The traffic figures are uncertain because the commercial activity varies rapidly. The existing line plant represents enormous sums, the use of which must be continued. The existing buildings should not be discarded and new sites can usually not be found right at the theoretical center of the traffic. Sometimes the available space will not allow the installation of all equipment, so that some trunking switches will be located somewhat outside of the shortest routes. In the outskirts of the city, even personal considerations play a role.

The theory of junction work is well represented in the German literature in papers and books of Kruckow, Langer, Lubberger and others, but, for the reasons mentioned, the theoretical minimum cannot

CODE NUMBERS

Long Distance.....K 0
Police .....K 1
Fire .....K 2
Information: Call code number of your exchange and 008; e. g., for Breitenbach, G 6 008.
Trouble Report: Call code number of your exchange and 007.

The Suburban K 9
gives service to:
Birkenwerder
Caput
Erkner
Rehbruecke
Oranienburg
Potsdam
Schmoecknitz
Werder

Adlershof .....F 9	Kaulsdorf .....E 9	Reinickendorf .....D 9
Alexander .....E 4	Koenigsstadt .....E 3	
Andreas .....E 8	Kupfergraben .....E 2	*Spandau .....C 7
	Kurfuerst .....B 1	Steglitz .....G 2
Baerwald .....F 6		
Barbarossa .....B 5	Lichtenberg .....E 5	Rheingau .....H 3
Bavaria .....B 4	Lichtenrade .....G 0	
Bergmann .....F 5	*Lichterfelde .....G 3	Steinplatz .....C 1
Berolina .....E 1	Luetzow .....B 2	Stephan .....G 1
Bismarck .....J 1		Suedring .....G 5
*Breitenbach .....G 6	Merkur .....A 6	
Buch .....E 9	Moabit .....C 6	Tegel .....C 8
	Moritzplatz .....F 1	Tiergarten .....C 9
Coepenick .....F 9		
Doenhoff .....A 7	*Neukoelln .....F 2	Uhland .....H 2
	Nollendorf .....B 3	
Friedrichshagen ....F 9	Norden .....D 1	*Wannsee .....G 4
Gruenau .....F 9		Wedding .....D 6
	Oberbeam .....F 8	Weissensee .....E 6
Hansa .....C 5	O. Schoeneweide....F 9	Westend .....C 3
Hasenheide .....F 5	Oliva .....J 2	Wilhelm .....C 4
Humboldt .....D 4		
	Pallas .....B 7	*Zehlendorf .....G 4
Jannowitz .....F 7	Pankow .....D 8	Zentrum .....A 4
	Pfalzburg .....H 1	

*Full automatic offices.

Fig. 2. Information Card Placed at Subscriber's Station.

be achieved in all respects. The principal result of the study of traffic problems is the knowledge that junction groups reach the maximum of efficiency at 100 circuits per group.

Each 10,000 unit—if it be a single exchange, or a main exchange with a plurality of sub-exchanges, has its own first selectors.

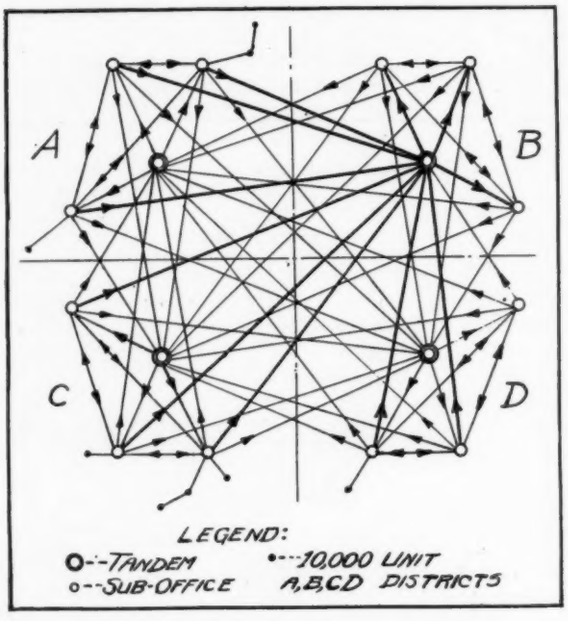


Fig. 3. Principle of the Layout of Berlin.

Junction cables run from the nine lower levels to second selectors of the corresponding districts. All incoming second selectors are installed in one office of each district. This office is called "tandem" (Knotenamt). Each junction group carries the traffic from a 10,000-unit to a whole district, and this is always a considerable amount of traffic.

There are nine tandems, one for each district. The tandem concentrates the traffic incoming to a district, but has nothing to do with the traffic outgoing from a district. All the nine tandems were cut into service during the night of April 23, 1927. The traffic outgoing from a district emanates at the levels of the first selectors in each 10,000 unit.

The traffic remaining inside of a district need not pass through the tandem of its own district. The 10,000 units that are filled up to some degree will receive second selectors of their own, and these second selectors distribute the inside traffic to the third selectors of the various 10,000 units of the district. The 10,000 units with a small equipment to start with will not receive second selectors, but the "own" district level will be carried to second selectors in the tandem in order to utilize the second to third selector junctions outgoing from the tandem.

Fig. 3 is a sketch of the trunking layout. The small single circles represent 10,000 units, or main exchanges having first selectors of their own lines and of their sub-exchanges. The double circles represent four of the nine tandems. The arrows indicate the directions of the connections.

Naturally, the sketch, Fig. 3, is an ideal plan. Small deviations will take place if the use of existing cables is more economical than the installation of new cables, e. g., if the factor of interest of a 10,000 unit with a neighboring district is large and a main exchange of this district is closer than its tandem, then the particular first selector level may be cabled to second selectors of such main exchange, thus avoiding the roundabout way over the tandem.

Present Condition.

Handling the traffic between the manual offices of the most varying design and age and the automatic offices was a difficult problem that was solved.

In manual to manual operation, the traffic between the manual offices stays as it is, showing at some places ring down, at other places order-wire junctions.

In manual to automatic operation, the manual subscriber is answered by an "A" operator in the usual manner. The subscriber gives the name of the wanted exchange and the "A" operator repeats and replies: "Ich verbinde weiter"—"I extend the connection." She inserts the calling plug into a trunk jack. The trunk ends at a second selector in the tandem of the desired district.

An intermediate rotary switch selects a free (semi-automatic) B position, also located at the tandem of the desired district. The "B" operator answers, saying: "Hilfsamt"—"Auxiliary Office," and the subscriber orders now the full number. These two terms have been selected to indicate to the calling subscriber that he has not yet reached the desired office.

The B positions are equipped with five-digit keyboards giving the well-known service. After setting the switches, the B position is cut off entirely, the release of the switches depending on the calling plug. After the cut-off of the B position, the calling subscriber receives the usual automatic signals (ringing tone or busy).

At present, B positions are installed only in the tandems of those districts (*C* and *G*), where automatic offices are working. Gradually all nine tandems will receive such equipment. The number of B positions depends on the traffic and on the number of the automatic offices of its district and on the number of all manual offices. The maximum of B positions will be reached at the time when about one-half of all subscribers are arranged for automatic operation. The maximum will be about 50 B positions per tandem office.

Much care has been taken about the indication for the metering of a connection originating in a manual office. A connection is to be registered upon a steady lighting of the supervisory lamp of the called side; no other connection is to be registered.

In automatic to manual operation, the automatic subscriber calls the code number (two figures) of the desired manual office. The second selector of the desired district gives access to junctions ending in single-cord circuits at the desired manual office. The "B" operator answers, and the calling subscriber orders the desired number.

To adapt the automatic circuits to the various manual circuits, sets of repeating relays are installed at the outgoing terminal of the junctions from the second selectors to the manual boards. The maximum of such repeaters is about 600 sets per tandem.

The B positions are equipped with the subscribers' multiple in all offices of a considerable size. Small manual offices that later on will be converted into automatic sub-exchanges of some "main exchange," are not called directly by the code dialing of a calling automatic subscriber. The code numbers would have to consist of three figures, which seems to be undesirable. Furthermore, the installation of third selectors and the corresponding power plants would be required right now.

The arrangement is this:

In the east Kaulsdorf and Buch are coded *E*9.

Southeast, Oberschoeneweide, Adlershof, Gruenau, Coepenick and Friedrichshagen are coded together *F* 9.

South, Lichtenrade is coded *G* 0.

A call, *F* 9, will reach an "A" operator at a manual board already serving these small exchanges. The concentrating A board for *E* 9 is located at Alexander, *F* 9 is located at Hasenheide, and *G* 0 is located at Suedring.

These office names do not appear in the numbers of the directory. When later on one of these small exchanges is cut over to automatic service—and it is the intention to make haste with it—its numbers must be changed to fit into the general automatic numbering scheme. Thus Coepenick will be *F* 4 Coepenick 4000 to 7999.

In other countries the connections of automatic to manual are established by means of call indicators. Although this method offers some advantages for the calling automatic subscribers, it could not be used for Berlin. Most of the manual exchanges of Berlin are so crowded that the space for the storing and indicating equipment is not available.

The cost of the auxiliary equipment is very high. The restricted means of the German Post Office made it more advisable to use the available money for equipment to stay. The call indicator would have to be installed in all manual

offices before any automatic office could be cut in. This necessity would have delayed the introduction of automatics while the waiting list of new subscribers would have grown intolerably.

Automatic to Automatic.

The nine tandems are the backbone of the full automatic service. They are now operating, and the insertion of new automatic offices is only a question of routine, no new engineering work being required from now on. The signals for the calling subscriber are these:

Dialing Tone: High-frequency buzzer, interrupted in the shape of the Morse "A" (short-long; the German designation of this signal is "Amtszeichen," "Exchange signal," and "A" is the first letter of this term).

Ringing Tone: High-frequency buzzer during the ringing periods.

Busy: Low frequency permanent buzzer.

The ringing current, flowing to the called station, starts with the "first ring," i. e., a ringing period immediately following the establishment of the connection. This is a general German practice and was introduced years ago for the sake of the P. B. X. ring-down trunks.

A detail of the metering circuit may be mentioned. Upon the answer of the called party, a metering impulse is sent to the first selector and is stored there. The meter itself is actuated at the end of the conversation.

It was German practice up to now to prevent the registration of successful local calls if the long distance office interrupted the local connection. This procedure was discarded for Berlin because the "don't register" signal was too difficult to bring through all the repeaters from the side of the locally called party.

Transferring Period.

One of the most important dates of the transfer is that of April 23, 1927, the beginning of the automatic tandem operation. The cut-in was well prepared by the Post Office and the installing firm of Siemens & Halske A. G. It was a full success and it was simplified by the fact that no subscribers' lines were cut over at the same time. The subscribers were well instructed and adapted themselves quickly to the change.

The insertion of the nine tandems into the system of Berlin consisted in the following details:

(a) Cut-over of Zehlendorf and Spandau to six-figure systems.

(b) Full automatic service between the existing automatic offices.

(c) Directing the traffic from Berlin to the southwest over the intercepting positions at the tandem G and also leading the traffic to Spandau over the tandem C.

(d) Opening of the service of all nine tandems.

(e) Inserting the special "B" positions at all manual exchanges.

(f) Inserting all the junction lines for the new equipment.

(g) Rearrangement of the special services (level *K* of first selectors) of the existing automatic offices.

(h) Cutting into service an "official" P. B. X. at each 10,000-unit for internal service and to attend to inquiries of the subscriber in service matters.

(i) Edition of a new directory with descriptive introductions.

To give an idea of the amount of work involved in these changes, it may be mentioned that about 180 miles of jumper wire were used in carrying out the new connections.

It was expected that some subscribers of Zehlendorf and Spandau would continue to call "0" to initiate a call to Berlin. To guide these subscribers, special supervisors were watching the junctions for these wrong calls, and after a few days the wrong calls all practically disappeared.

The dialing is a two-wire circuit for the single lines and a one-wire and ground circuit for the small P. B. X.'s. The 60-volt feeding bridge for the calling party is located always at the exchange where the subscriber's line ends. The first selector is an impulse repeater.

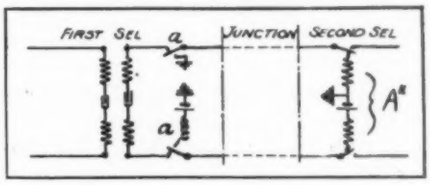


Fig. 4. Principle of Impulsing Over Junction Lines.

Fig. 4 shows the principle of impulsing over the junction lines. In the first selector the talking leads are separated by a repeating coil. The letters *a* indicate two contacts of the feeding and impulsing relay, *A* (not shown), controlled by the calling subscriber. The impulsing relay *A"* of the second selector is a double-wound relay connected to the two sides of the battery. The subscriber's impulse relay *A* drops back during the interruption of the dialing impulses and the contacts, *a*, connect the opposite poles of the battery to the talking leads, thus energizing the two windings of the impulsing relay *A"* at the second selector with double force.

If the earth potentials of the two exchanges are not the same, their difference will strengthen one of the two branches and weaken the other, the result of both being practically uniform. The impulsing over the junctions is, therefore, independent of the ground potentials. This impulsing is successful over all the distances in Berlin, reaching well over 35 miles.

The switches are held and released over the third wire. Long junctions consist of two wires and repeaters are inserted at the outgoing ends. They transmit the dialing and releasing signals forwardly and various signals backwardly, like the metering impulse, test for the presence of the calling party before sending out the first ring, preventing the release from the side of the calling party in case of malicious calls.

Adaptations in the Manual Offices.

In most of the present manual exchanges the line relay is also feeding bridge. The cut-off relay acts only to cut off the line lamp and controls the supervisory lamp of the cord laying in the third wire. The "B" cord operating with this line circuit has seven relays. It has an automatic ring and it busy backs the junction as long as the "B" cord is not released and the "A" cord is withdrawn. It allows the automatic ringing to restart by a momentary withdrawal of the occupying "A" cord.

The "B" cord is a universal cord insofar as the changing of a few straps adapts the cord to cooperate with any kind of "A" board. Furthermore, the same kind

(*Please turn to page 29*)

Householders of Berlin Who Have Telephones in Their Homes Are Going to School in the Evenings Now, Because There Has Been a Radical Change in the Telephone System, Making It Necessary for Them to Learn How to Operate the New Dial System. These Classes Are to Be Continued Until the Entire City Is Covered.

News Items of England's Telephones

Cutover of First Automatic Exchange Marks Definite Milestone in One of Most Gigantic Telephone Jobs Ever Contemplated—Post Office to Install Telephones at Small Railway Stations for Public Use—Other Items and Comments

By "Telephony's" Special Correspondent

The event of last month was the birth of London's first automatic exchange which came into being at midnight on November 12.

Even to those of us who are familiar, from experience in other parts of the world, with the processes of automatic telephony, there was a thrill in the thought that a definite milestone had been reached in the direction of the completion of one of the most gigantic telephone jobs that have ever been contemplated, for such is the total conversion to automatic working of London's far-flung, complicated, multi-exchange telephone system.

The old Holborn exchange lies eastward of the new building—formerly the Inns of Court Hotel—and here on the fourth floor was stationed a gang of 20 men. At the first stroke of midnight, each one pulled his first loop of tape, withdrawing 20 heat coils, and disconnecting 20 subscribers. The whole of the 7,000 subscribers were "cut out" in a few minutes, and the "all clear" word was passed through by telephone to the controlling officer at the new exchange.

His curt "cut in" was the signal for the pulling out, 200 at a time, of wooden wedges on the main frames, thus establishing individual connection with the new apparatus. The whole affair was the work of a few minutes. The portable testers were at once brought into action, and by the early hours of Sunday morning every individual subscriber's unit of plant at the exchange had been tested and reported in good working order. The main point of entrance of the cables is provided by a two-mile length of old tunnel, constructed 60 years ago by a firm of carriers and used by them for the purpose of the conveyance of parcels.

Holborn is essentially a business subscribers' exchange, and normally carries a negligible traffic on Sundays. Monday morning, therefore, proved the real test. At the same time it disclosed a psychological human reaction which, though embarrassing to those responsible for the handling of the service, could not fail to amuse the world at large.

It is evidently not only the young mind that wants to "see how it works." This human and praiseworthy attitude of mind was common to every Holborn subscriber, young and old, male and female, from 10 o'clock onwards on Monday morning. Everyone wanted to try the new dial, everyone wanted to ring his own number and get his own "busy back" signal.

The decision of the General Post Office to install telephones that may be used by the public at small railway stations throughout the country has received a warm welcome from agriculturists and country dwellers generally. Negotiations, in which the Telephone Development Association have played no insignificant part, have been in progress for quite a long time.

The usual fear, however, that has always hampered our rural telephone development—that the volume of traffic to be expected would not warrant the installation of a cabinet and coin box—has been operating in this instance also.

The compromise that has been arrived at will provide an open telephone, probably in the booking office, and the booking clerk or more usually a porter who in the country stations often has to be booking clerk as well, will receive and account for the money.

Satisfaction General.

Telephone experts consider the decision to mark an enormous advance towards the general telephonization of the country-side, while agricultural authorities welcome it as likely to give the farmer that access to that prompt market information, the lack of which has been always one of his greatest handicaps.

The work of the police, too, will be greatly assisted by the ability to communicate rapidly with the authorities in the country and—the first lines once laid—it will be a comparatively simple matter to develop a complete police telephone box system over the whole country, that will add considerably to the safety of town and country dweller alike. Very few decisions of the post office, in fact, have given greater general satisfaction.

Lord Oxford and Phono-Phobia.

Lady Violet Bonham-Carter, the daughter of Lord Oxford and Asquith—better known perhaps as Mr. Asquith, the Liberal ex-premier—recently made a surprising revelation about her father at the speech day of a Yorkshire secondary school.

"You may be surprised to hear," she said, "that my father has never learned to talk on the telephone, and to this day cannot do it."

Continental Charges Reduced.

The Postmaster General will shortly announce a reduction in the charges for telephone calls between this country and Germany, Denmark, Norway and Sweden. The reductions, it is expected, will be 25 per cent on the existing rates in both directions and they will probably take effect in December, when the reduction of two shillings per three-minute call to Holland is also due.

Exeter Automatic Exchange and London Kiosks.

The 1,800 subscribers in the Exeter and Topsham areas were transferred to the new automatic exchange on November 26.

On November 18 there were 721 kiosks in the London telephone area. The weekly receipts from a kiosk vary from a few shillings to three or four pounds.

Transatlantic Telephony.

According to the Postmaster-General, since the inception of the transatlantic service the total number of calls to and from England and Canada up to November 18 has been: to Canada, 28; from Canada, 13; the average duration of calls was 4 minutes, 48 seconds.

Signor Marconi expects soon to superimpose an efficient wireless telephone service on the beam now radiating from London to most parts of the British Empire, it was announced at the annual meeting of the Marconi Company held in London on December 22.

Bogota (South America) Company Asks for Higher Rates.

The annual meeting of the Bogota Telephone Co., Ltd., of Bogata, Colombia, S. A., was held in London on November 25. In presenting the report Chairman H. Kahn, after reviewing the accounts, said that the company now had over 3,000 applicants for telephones on the waiting list. Cables, switchboards and other equipment are being obtained as quickly as possible to meet that demand and a new exchange and sub-exchange are being built in the residential quarter of Bogota.

Pending the installation of the new main switchboard, private branch exchanges are being supplied which would increase the revenue. At present they had 5,397 lines in operation and the new equipment would make provision for a total of 10,000 lines.

Bogota is a rapidly-growing city and will require more telephones and the directors constantly endeavor to meet and anticipate the requirements. They asked the municipality to help them by allowing rates which would enable them to cover the ever-increasing expenses of public utility companies, so that they may gain the confidence of those who would be asked to provide funds for further extensions.

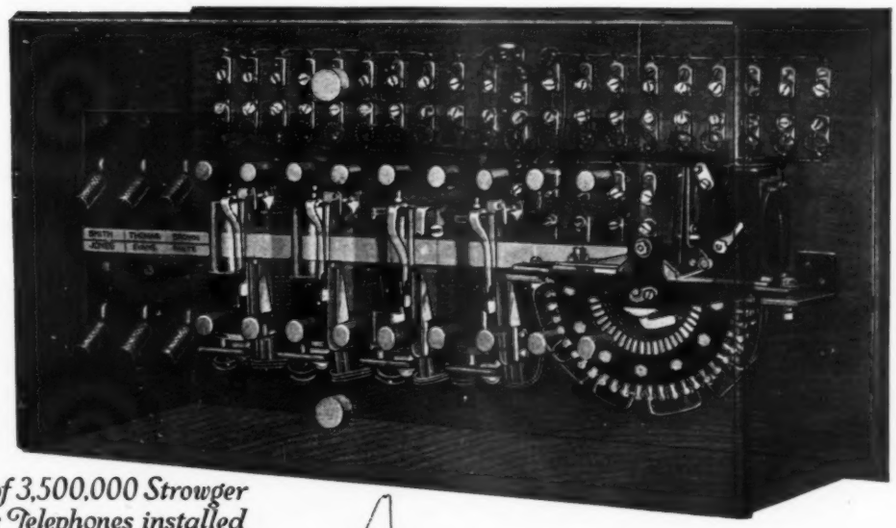
THE A. T. M. FIREMEN'S CALL BELL SYSTEM

THANKS to its universal adaptability the use of "Strowger" mechanism is not confined to Automatic Telephony.

Here we have an example of its application to Fire Station equipment.

A separate key is provided for each fireman, and a master key which controls a "Strowger" rotary switch, is operated when a "Fire Call" comes through. This sends out a regular sequence of current impulses and rings the bells of all firemen whose keys are in the "Duty" position.

Furthermore, each bell can be rung separately and by the operation of a test button the whole system of firemen's bells can be tested at will.



Upwards of 3,500,000 Strowger Automatic Telephones installed or under construction throughout the world

Automatic Telephone Manufacturing Company, Ltd.

Strowger Works, Milton Road, Liverpool, England

Associated Company—International Automatic Telephone Company, Ltd., London, England

Maintaining Strowget

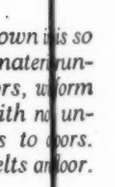
Saving Time With Aut

The gravity conveyor shown i s designed that trays of mater ru way from the upper floors, w or speed to the basement with n u less diverted by switches to o Motor-driven starting belts a oo

STROWGER

getomatic Supremacy---

AutConveying Machinery



THROUGHOUT the factories of Automatic Electric Inc. every time-saving or labor-saving device that is adaptable to any phase of Strowger Automatic equipment manufacture and that experience has shown to be practicable, has been made use of to increase production efficiency and lessen ultimate cost. The spiral runway shown here extends from the basement up through several floors of one of the factory buildings, and greatly facilitates and speeds up the transfer of partially finished parts between the different departments in which they are fabricated.

This gravity conveyor and many other similar devices bear witness to the up-to-date factory methods employed by Automatic Electric Inc., in the production of Strowger Automatic telephone equipment. The manufacturing departments have been no less alert than the research and development departments, and that the methods used by the former have kept pace with the inventions and improvements in apparatus design accomplished by the latter, indicates an organization unique in its departmental coordination and in the singleness and unanimity of purpose of its personnel.

This is one of a series of advertisements illustrating the exacting care exercised in the production of Strowger Automatic telephone equipment, which is thus kept constantly in advance of the telephone art.

Automatic Electric Inc.

Factory and General Offices: 1033 West Van Buren Street
Chicago, U. S. A.

ERAUTOMATIC

Progress in Equipment and Supplies

Exhibits at State Convention Reveal Progress in Many Directions—Improvements Noted in Cable Terminals—Comments on Other Exhibits—Shortage Observed in Exhibits of Testing Instruments—Practical, Time-Saving Kinks

By Ray Blain

Happening to be in Indianapolis during the time that the Indiana Independent Telephone Association was in session last fall, I dropped in to have a "look-see." Due to the fact that my time was limited, I was unable to attend any of the meetings or get in on the eats. I did, however, meet some of the gang and had a very pleasant time looking over the exhibits of the various manufacturers.

I was pleased to note that there were many worthwhile improvements in equipment on display, which brought to my mind this question: If there never had been any Independent telephone companies, would we have ever reached the high state of perfection of telphony in the United States in such a short time as we have today?

I can think of a number worthwhile features which were first brought out several years ago by some of the smaller concerns and which are almost universally used today. I consider that each plant man in the Independent field is an engineer. No doubt many who read this, especially the ones with a right to use some letters after their names, will smile.

The dictionary gives several definitions for the word "engineer," such as "to lay out or manage; to guide the course of," etc. I would define an engineer as one who creates anything, or one who plans that others may create correctly.

Some of our larger organizations, due to their standardization of methods, have only a few who are engineers in the true sense of the word. The others, though called engineers, are so restricted by set rules which they must follow in engineering any project, that they are in reality just high-priced technical clerks. The majority of these men are capable and could do some original thinking if they were not so restricted that they have no occasion to exercise their individuality. They are so tied up in this routine that they would not think of deviating from the beaten path, even though it might be more suitable for the case at hand.

In the Independent field, this standardization not being necessary to any great extent, each individual must work out his own salvation in accordance with his particular requirements.

He seldom has an opportunity of referring his problems to higher authority, but must work out some solution unassisted.

This process, while not as efficient perhaps as the system of the larger companies from a money point of view, does in my opinion develop the natural talent in men more rapidly. Problems in practical telephony, just as problems in arithmetic, are always better understood if solved by the individual than if worked out by the instructor.

The only undesirable feature that I can see in the Independent telephone field—and its elimination would prove a real benefit—is the fact that there are so many excellent ideas worked out in one exchange that would be very useful to many, and there seems to be no way to circulate this useful information.

The Best Advertising.

The best possible advertising is that which actually sells the most goods on the merit of the goods. In this generalization I include even the kind of advertising that is called institutional, for its purpose is to build goodwill, and ultimately this goodwill must be reflected in sales volume.—Carl Byoir, President, American Gears Co.

The technical publications, such as TELEPHONY, help a lot, I know, but there are so many practical telephone men who have neither the time nor the inclination to write up their ideas for publication. I have known others who worked out some wonderful ideas but did not consider that they were of any value to anyone else, and never bothered to write them up. Conventions are also very useful in this connection, but when so many important things are crowded into a few short days it is almost impossible to cover everything.

During the past ten years it has been my pleasure to visit several hundred small telephone exchanges not only in the United States but also in China, Japan and the Philippine Islands. There were only a very few of the exchanges visited at which I could not pick up some useful bit of information on some way of doing some task which was better than the way someone else did it.

In one exchange I found an old-timer using a hacksaw to cut the nails between the pole and the wood bracket to remove the latter. Now, I had watched wood brackets knocked off with a handaxe for years and never thought of this easier way of doing it.

With the old method, as everyone will agree, it is some job, plus the fact that in so removing the bracket is usually broken up in such a manner that it is unfit for reuse. The lower nail usually splits out the lower hole in the bracket; also, the pole is usually marred and the spike holes are left open. By using the hacksaw method, the bracket is removed with a very little effort, and the pole and bracket are both left in good condition.

On another system I found a man using No. 17 copper-clad steel drop wire for tying up cable splices. He used a piece of the single wire, insulation and all, and made a tie that was in appearance very similar to the usual marlin tie, but, as I understood, it lasts years longer. I have been using this method ever since and have not found that it caused any trouble or that there was any objection to its use.

I found another man who had built a tool, by making use of a safety razor blade and hardwood, for cutting the outer braid from switchboard cords in preparing them for rebutting. The tool would just cut the outer covering but would not damage the insulation or the tinsel of the conductors. This tool was superior to anything I have ever seen for this purpose.

Arthur Brisbane, in one of his excellent editorials some time ago, made the assertion that there is very little original thought in the world and that we are all more or less imitators. I feel that we should overlook this, for he, no doubt, never had anything to do with the Independent telephone field.

The greatest improvement noted at the Indianapolis display was in cable terminal and protector equipment. One commendable improvement is that better stock is being used in the springs of protected cable terminals. This is important, for everyone knows what it means for one of these springs to break off on the last vacant pair in the terminal when a rush is on.

The absence of soldered connections in connecting drop wires to terminals is another improvement. Fuses held tightly in place with a screw or other means to prevent cut-out and noise trouble is another needed improvement. I was also pleased to note that larger threaded studs were being used for punchings in the unprotected cable terminals, which should prevent them from breaking off so easily.

One terminal of the unprotected type was built with the lid sloping back toward the top which would permit the pole being raked far out of plumb before the lid would open. This is an excellent idea. It is strange that so many terminals have been constructed with lids perpendicular

Of course, cable terminal poles should not rake the wrong way, but we all know that there are times when they do and that they cannot always be repaired immediately. This same cable terminal had all drop wires entering through separate holes at the bottom which were closed by a small cork until needed. The cork stays in place much better in the bottom than in any other part of the terminal.

This I believe is an excellent idea as it helps to exclude moisture and, in certain districts, to keep out spiders that make nests on the punchings of the terminals and cause considerable low resistance trouble. Making the lid of the terminal sloping toward the back provides enough room for the drop wires to enter from the bottom in the manner described without crowding.

Switchboard design, in my opinion, shows a marked improvement, except that in some cases there seems to be a tendency to make the cabinets too small, which crowds the equipment and makes it difficult to maintain. I still believe that this is due to the fact that the man who designs switchboards does not ever have to maintain them, so does not give this all important point proper consideration.

There are without doubt many improvements being made in the design of line jacks and plugs. Cords have reached a state that is very near perfection. I am pleased to note that some have discontinued the practice of shellacing cable forms.

There is also a marked improvement in telephones of both common battery and magneto. I wonder why they do not make a magneto telephone with a metal case? The making of as many parts as possible interchangeable between the wall and desk type telephone is a great improvement. I consider the "French type" telephone the height of perfection, and I think that it will not be very many years until it has replaced the majority of our present style desk sets. The enclosed gongs was a great idea, both in appearance and from a maintenance standpoint.

The use of copper-clad metal for cable hangers and messenger is a good idea and will no doubt mean a big saving to many companies if properly used. We know that in a comparatively short time the smoke from trains will eat away the cable rings and then weaken the messenger strand so that it must be replaced.

This copper-treated metal will no doubt last for years under these conditions. Even though its first cost may be greater, the fact that it will last a long period of time and save the labor of replacing the cheaper material, will certainly prove its worth. I have a difficult job at the present time to replace the messenger and rings over a railroad crossing in a busy freight yard. This will be both an expensive and dangerous operation.

One thing I noticed in the exhibit was a shortage of testing instruments. This made me think that perhaps some companies did not do all the testing which they should. I believe that all systems, large or small, should be equipped with an adequate wire chief's testing set. Then, if the lines are properly tested and records maintained, a lowering of the insulation resistance of a line or cable can be readily noted, and repairs can be made before trouble develops.

This procedure will many times save the company money, and the prevention of trouble tends to improve the service which makes better satisfied subscribers.

California's Fine Luncheon Meeting

Adjourned Meeting of California Association Held in Los Angeles Featured With Address by President F. B. MacKinnon of National Organization—Responses Indicate Harmonious Relations Between Independent and Bell Groups

When the meeting of the California Independent Telephone Association adjourned at Santa Monica on Friday, December 9, it was with the understanding that a further session would be held at a later date when F. B. MacKinnon, president of the United States Independent Telephone Association, would be in California on a short visit. Accordingly arrangements were made and a goodly number of the Independent telephone men of Southern California sat down to lunch at the Jonathan Club, Los Angeles, on Saturday, December 17, with Mr. MacKinnon as guest of honor.

After luncheon was finished, President Charles A. Rolfe introduced Mr. MacKinnon to the assembly, that he might bring to those present a message concerning the telephone industry in the various parts of the country.

Mr. MacKinnon, in introducing his main topic, stated that he had been sorry that he had not previously been able to meet with the members of the California Independent Telephone Association, but that his duties required him to spend a good deal of time in traveling, and also the maintenance of two offices for the association, one in Chicago and the other in Washington, D. C., made necessary the division of a considerable portion of his time between those two places.

Reviewing the telephone situation somewhat, he said that for a number of years the problem of the Independent telephone industry had been to get men to do the work and to get money to pay for the work done. For some time now the situation as to men has been quite satisfactory, and during the last one or two years the money market has been such that no telephone company has had any trouble finding capital sufficient for its needs. However, the very plentiful supply of money has introduced a new problem in the Independent industry, a problem which he felt should be solved by that branch of the industry itself.

For a good many years, two decades ago, the Bell and Independent telephone divisions of the telephone industry had been in competition with each other in many places. In other sections of the country, the Independent people had undertaken the development of local service which had not been provided by the Bell people in the smaller towns because of their attention to the great problem of telephone service in the large cities. In the latter sections competition was unknown, while in the former it was in many cases a fierce struggle. During the past decade the former competing plants have, as a general thing, been consolidated under one head, and the Bell and Independent telephone groups have set out to the task of rendering telephone service to the country as a whole.

The two large groups in the telephone business have thus developed the service and have built up a common understanding and also a common language, realizing the fact that the telephone business is different from all other businesses; it is the only business in which the cost of operation increases with the amount of business done.

With the increase of the supply of money in the country, new business interests were becoming interested in the telephone industry, coming into the telephone field and buying properties from the old-time telephone people who had owned and operated them for many years.

These newcomers were not telephone men in many cases, but were financial men who had analyzed telephone properties in the same manner in which they would analyze any other business. They had perhaps thought that by consolidation of small plants and an increase in the volume of the business done, they could effect economies and thus make money. But without experience, and without knowledge of the fundamentals of the business, they had not realized that such economies would not be forthcoming.

Two other general motives also were found to furnish the incentive for purchases. First, to have property against

which securities could be sold; and second, to purchase plants with the idea of holding them and then later disposing of them to other interests at a profit.

Particularly if the motive for purchase is the first mentioned, the promoters are very liable to issue against the property purchased almost its full value in bonds; and on top of the bonds, issue also preferred stock and then common stock.

An analysis of financial circulars presented to the public will show, frequently, that after proper allowance has been made for depreciation, there is not enough left to pay interest on the securities outstanding. This can only be found by analyzing the prospectus, as the general style is to show the amount of earnings available for depreciation and dividends as a whole, without separating the two factors.

Sales and consolidations have been made generally among the smaller companies. There are some 9,000 telephone companies in the country. Of these 27 are associated Bell companies. There are 52 class A Independent companies, 73 class B companies and 69 class C companies, the large balance being the small D companies.

Of the class A companies only four changed hands during 1926, 17 of the B companies changed hands, and 22 of the class C companies. The rest of the sales were class D companies. Thus many of the promoters have gathered together a number of small plants and are trying to run them as one unit. This can not be done.

Mr. MacKinnon's message to the California people was to carefully consider the matters which he had set out, from the history of purchases and consolidations in the East, to consider before selling out just where money could be invested as safely and with as good return as in the telephone business; and in analyzing the various prospectuses offered for public perusal, to bring to the attention of the banker or the financial men of the community the fact that the securities offered are upon a property not being run on a sound financial basis, if such is the fact. For if such securities are distributed throughout the community and the business does not prosper, it will have an adverse affect on the securities which substantial telephone companies have to sell.

Following Mr. MacKinnon's talk, A. Wardman, secretary of the Whittier Home Telephone Co. and also of the Downey Home Telephone Co. responded. He declared that the telephone people in California, both Bell and Independent, are working together for the service of the public in a manner, he believes, more harmonious than in any other section of the country.

For this happy situation not a little credit was due to N. R. Powley, general manager in Southern California, for the Pacific Telephone & Telegraph Co. and to his general commercial agent, Jack Adams, who has been handling all relations with the connecting companies over the last seven years.

Mr. Powley, in response, stated that he trusted that the present happy relations would continue, and that he would do what he could on the part of his company to retain the present status of cooperation between the two groups.

Before the meeting adjourned, a motion prevailed to have a committee appointed to consider the calling of a conference of the security holders of the various telephone companies to consider the problems of the telephone business and their effect on the value of the securities.

The association extended to Mr. MacKinnon a rising vote of thanks for his address, and also for his kind treatment of the California association and its members in their trips to national conventions and committee meetings. President Rolfe also presented Mr. MacKinnon with the gavel, made of orange wood, which had been used during the meeting, with the hope that it would serve as a pleasant reminder of his visit with California telephone men.

A QUESTION-BOX DISCUSSION

By Miss Anne Barnes,

Traveling Chief Operator, Iowa Independent Telephone Association, Des Moines, Iowa

A question placed in a question box during a recent convention of operators was, "What are the advantages in having a quiet operating room?"

Questions of this sort are often discussed in conferences and many valuable suggestions are made by various people present.

I attended a traffic conference a few weeks ago which fairly bristled with interest. There were many good suggestions for chief operators and operators in small offices where there is no chief operator employed.

The leader of this conference said to me: "Don't you think we should have the general proceedings and discussions at conferences made a matter of record?"

"Yes," I agreed, "because we not only wish to help those who are able to attend the conference, but also those who are unable to attend. Somebody has to stay home and take care of the service. Not all managers can afford to send operators to a conference, especially a state conference; and, of course, there are always some operators who do not care to come."

If traffic discussions are recorded in full and appear in our good telephone magazines, we are going to reach many operators whom we do not reach otherwise.

The following are the notes I took at the traffic conference in which the question, "What are the advantages in having a quiet operating room?" was discussed.

"Where operators are working quietly their efforts seem more easy and natural."

"I notice that my operators do not have to repeat so often when they speak quietly into their transmitters."

"It seems to me that we do not have the misunderstandings and friction that we used to have since we have our new board and have learned to speak quietly."

"I find it easier to develop concentration and attention since my operators are speaking in a courteous, even tone of voice."

"By working and speaking quietly we create a more favorable impression of our service, both with our subscribers and other operators."

"Since we have learned to speak directly into our transmitters and are careful in handling our ringing keys, calculagraph levers and other equipment quietly, I believe we all feel better physically. There seems to be no nervous strain on our operators any more. Work is now a pleasure."

"We found we did not have our chairs properly adjusted and were not sitting correctly. We became weary before a day of normal work was over. We know now that our wrong habits of posture caused us to breathe incorrectly. We rarely got through a day without some difficulty. But that is all in the past. We found that before we could speak quietly we must sit correctly. Now we are doing both."

"We found that a number of things besides loud talking had to be corrected in our office."

"Everybody from the manager down entered and left the room with a bang. Windows and curtains were raised and lowered noisily. Headsets clattered while being put on or stored. And above the snapping of keys and fall of cords we raised our voices discordantly."

Automatic System, Berlin, Germany

of "B" cord is adaptable to the internal service in the offices having no "A" multiple.

There are "A" boards with local battery service having positive or negative supervisory signaling, and common battery

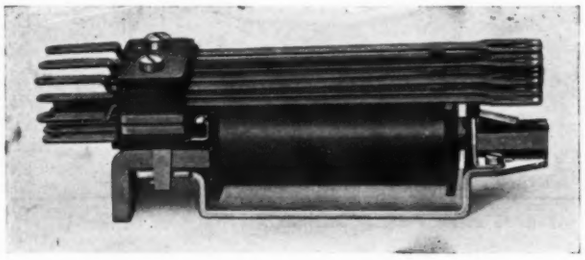


Fig. 5. The Line Switch.

boards with feed from the line relay, or feed from the bridge in the cord; and finally there are two-wire multiple boards, one of them with a capacity of 18,000 lines, built about 20 years ago. Most "A" boards work with order wires to the "B" board, but some also with ring-down trunks.

The principal advantage of the "B" cord lies in the fact that the "A" cord controls the supervisory relay of the "B" cord over one talking lead, and vice versa the "B" cord controls the supervisory signals of the "A" cord (and the busy back outfit) over the other talking lead.

The "B" cords could be used for the traffic incoming from automatic offices with one change, using one of the one wire features for the registration.

The manual signaling was adapted to the needs of the calling selectors by inserting a set of five relays at the outgoing

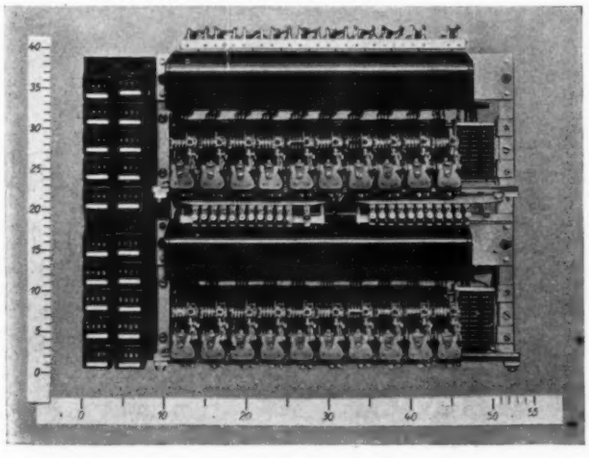


Fig. 6. Frame of Line Switches.

ends of the junctions located in the tandem offices. The universal nature of the "B" cord made it also possible to use one kind of relay sets, so that these sets of relays are also universal and may be used at any

(Continued from page 21)

tandem, thus safeguarding a minimum of equipment, excepting the few sets for E9, F9 and G0.

Some of the two-wire multiple offices did not have "B" cords with the automatic ring feature. They were equipped with new circuits. But this is the only big change in the manual offices.

The one change hinted at a little previously was made in all cords. The calling subscriber shall receive the "ringing tone signal" just as in full automatic connections. This necessitates the replacement of a single winding relay by a two-winding relay, the new winding bringing in the ringing tone. The functions of the relay, however, were not changed, so the work would not interfere with the manual operation of this relay.

Special care had to be taken about the "official" connections free of charge (information, recording, trouble, etc.). The manual circuits of these comparatively few subscribers were changed upon the answer of the free-of-charge subscriber. A slow-acting relay in the third wire of the line circuit allows the answering signal to exist only momentarily, i. e., so long that the automatic ringing is cut off, but the metering impulse will not become effective.

In order to support the metering impulse, the set of relays (at the second selector in the tandem) contain a timing device. The ringing machine for the intermittent ringing energizes a sequence of relays (one set of such sequence relays for 40 junctions) in periods of about 1.6 seconds per relay. Now, the start of the metering impulse will energize a certain relay (in the five-relay set); and only if this relay is energized for more than one of the periods, second relay will be energized to give the metering impulse back to the switches. The momentary answering signal of the free of charge lines will never last that long.

The circuits of the special "A" positions, E9, F9, G0, are interesting because of the fact that they show the simple way of adaptation. The trunks, starting at sets of two relays in the tandem, terminate in four-point answering jacks at the special "A" positions. The line circuit has three relays, the cords remain as they are. The metering impulse is sent by depressing a button, as is now manual practice. To safeguard the registration, the switches are held by the answering cord, the replacement of the receiver at the celling automatic station energizing only the supervisory signal in the "A" cord.

The switches are all worked from 60-

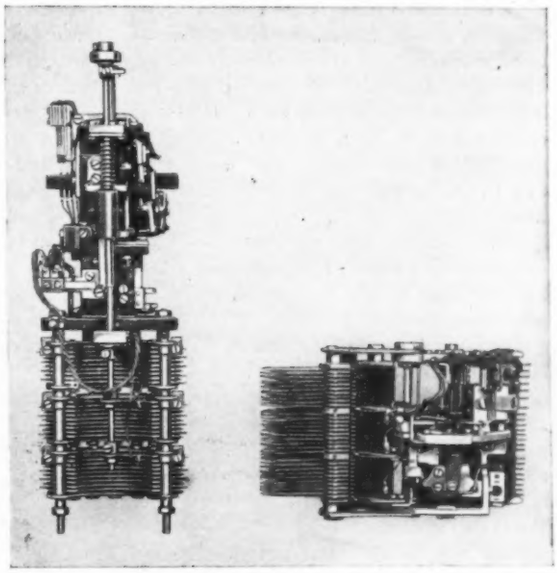


Fig. 7. New Siemen Type of Switch.

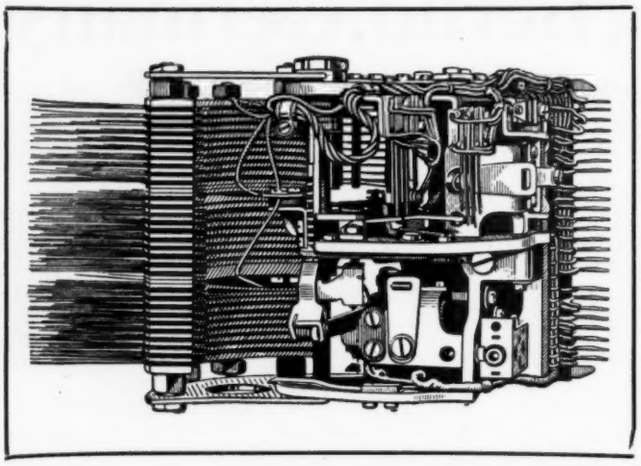
volt batteries, all manual circuit from 24-volt batteries, care being taken not to oppose the different voltages against each other.

The circuits of the semi-automatic "B" positions (manual to automatic traffic) do not show any peculiarity for Berlin. Each position has two keyboards. The "senders" are sets of relays installed inside of the cases of the positions. Each sender is assembled on a removable base plate, so that in case of trouble a new sender may be inserted on a moment's notice.

The signaling between the calling "A" cords and the switches is transmitted back and forth by a set of seven relays, located at the tandems.

Auxiliary Facilities.

Calls to the information and trouble positions are free of charge. Each 10,000 unit has its own information and trouble desks attached to levels of the fourth selectors so that a subscriber has to call C7 (Spandau) 007 to reach the trouble clerk



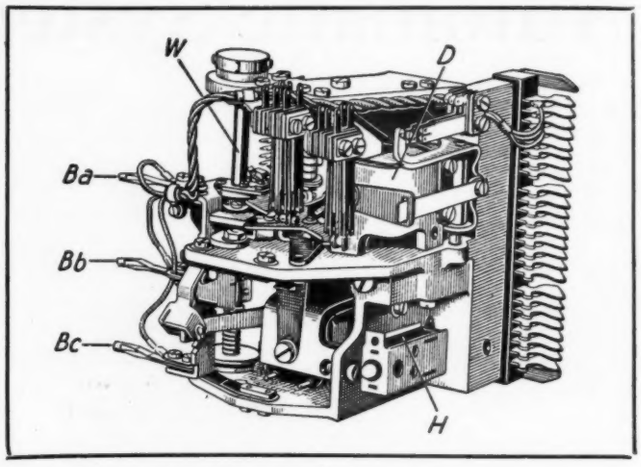


Fig. 8. Front View of the New Siemens Switch.—Fig. 9. Rear View of Switch.

of Spandau, or C7 Spandau 008 to reach the information of Spandau.

Calls to the various departments of the telephone administraton, like billing department, manager, etc., are not free of charge. The public usually is not familiar with the organization. Therefore, each 10,000-unit receives a P. B. X. of its own, attached to the P. B. X. connectors. The operator of this P. B. X. will help to find the proper official.

Public service free of charge is this: K 0, recording office; K 9, suburban (A-B toll) service; K 1, police alarm, and K 2, fire alarm.

The second selectors for the K level are installed in the tandems. A study showed that the police and fire alarms fitted in best when doing so. Police and fire alarms are wired as non-release connections for the well-known reasons.

It is not the proper time to enter into a discussion of the suburban and long distance service. Both are undergoing just now a complete rearrangement. The suburban service (in German, "Schnellverkehr"—A-B toll) shall comprise all connections within a radius of 35 to 40 miles, the calling subscriber waiting with the receiver off the hook for the completion of the connection.

The incoming suburban service is handled like the manual to automatic traffic.

For long distance work, a new large office building is going up. The ultimate capacity of this long distance office is figured to be about 4,500 long distance lines and 7,000 to 8,000 local connecting lines. Berlin is the geographical center of east, west and north-south traffic of Europe, except England to France and Italy.

To connect the subscriber's line to the long distance junction, the large automatic offices will receive manually-operated switching sections. In slack periods these manual sections are cut out and the long distance operator will call the wanted party all over switches. The small automatic offices will not be equipped with such switching sections. But the connectors are combined long distance and local switches, giving the same facilities as the cords of the switching sections.

The office for receiving telephonic orders for telegrams is now connected to the manual exchange "Norden"—D 1. Later on it will be a P. B. X. connection of the D 1 office.

Building Program.

The lay-out, the equipment and the transfer are comparatively simple. This outstanding feature is the result of the choice of the simple, most adaptable and

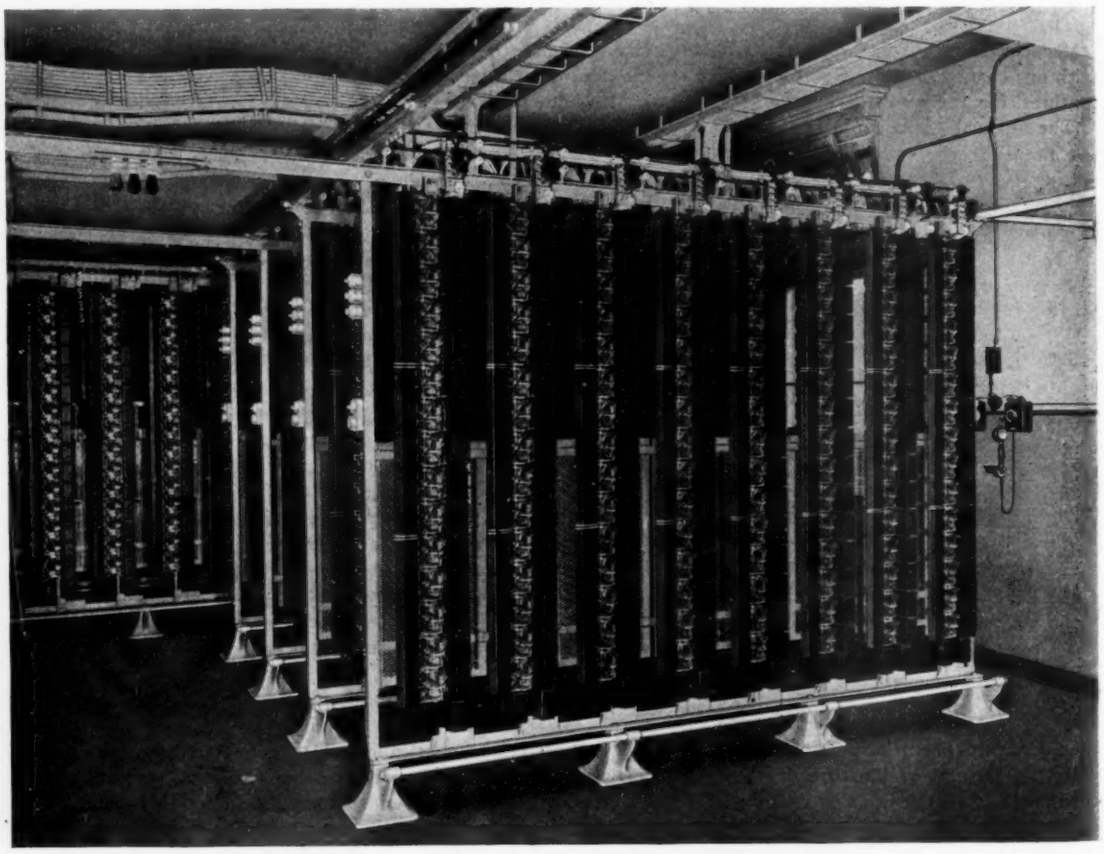


Fig. 10. Group of Second Selectors in Tandem Office in Berlin.

flexible system consisting of the decodal step by step switches without storage and translation. The increase of the office code from two to three figures raises the capacity of any district to anything desirable without touching any of the previously existing plant.

A review of the operating automatic offices, and of the immediate future plans, may conclude this description.

Operating Offices (July, 1927).	Present Capacity.	Code No.
Lichterfelde	6,000	G3
Breitenbach	4,000	G6
Zehlendorf	3,600	G4
Wannsee	2,000	G4
Spandau	3,000	C7
Neukoelln	3,000	F2

In course of erection are:

	Present Capacity.	Code No.	Cut Over.
Jannowitz	6,000	F7	1927
Baerwald	8,000	F6	1927
Berolina	10,000	E1	1928
Kupfergraben	10,000	E2	1928
Bavaria	9,000	B4	1928
Buch	400	F7	1928
Cladon	200	G4	1928
Lichtenberg	5,000	F5	1928
Reinickendorf	3,000	D9	1928
Schoeneweide	2,000	F3	1928
Gruenau	1,000	F4	1928
Barbarossa	9,000	B5	1928

Supposing that an installation annually of 40,000 lines may be kept up, the transfer of all Berlin to all automatic service may be finished in 15 years—1942; in this year it is expected to see the last manual board in Berlin disappear.

Types of Switches.

All switches are of the step-by-step type. The diagram shows the sequence of primary line switches (10-point rotary), secondary line switches (15-point rotary), first, second, third, fourth selectors and connectors, all major switches being 10 vertical, 10 rotary switches.

The line switch is shown in Fig. 5. The driving mechanism is arranged in front of the wipers. Fig. 6 shows 20 line switches assembled in a shelf, and five frames (100 switches) form a frame 20 ins. wide and 7 ft. 8 ins. high (measures of Fig. 6 are in centimeters).

The major switches are new designs. Fig. 7, at the right, shows the new Siemens type. Figs. 8 and 9 are views of one of these switches. They have a vertical and a rotary magnet, but no release magnet. For releasing, the switch is rotated beyond the end of the bank, drops then to the low level and returns to normal underneath of the lowest level.

Fifteen of these switches are assembled vertically, one over another, the frame being 7 ft. 8 ins. high. The width varies with the number of relays in the various ranks. The second, third and fourth selectors have the fewest relays; their frame is 13 inches wide. The most complicated connectors with many relays have a frame of 23 inches width. The frames are assembled side by side. Fig. 10 is a view of a group of second selectors in one of the tandems.

Transatlantic Telephone Operated at Loss as Expected.

Criticism of the administration of the transatlantic telephone service was raised in the house of commons on December 22. Questions were asked as to the chances for a reduction in the present rate of £5 a minute and whether it was true so little use was made of the service that heavy financial loss to the government was likely.

Lord Wolmer, assistant postmaster, said the British and American officials were continually striving to improve and popularize the service, which at present pays its working costs, but not depreciation and amortization.

He denied that the transatlantic telephone actually is losing money. He said it is paying expenses, though not providing for depreciation and amortization, but that there is every prospect to put it on a really paying basis. Business is increasing all the time, he said. One hotel in London alone booked more than 50 messages to various parts of the United States for Christmas day.

Britishers apparently are using the service but little—the total average of daily calls from the British side to America is only 2.8. From January 7 to November 11 of this year the total number of calls originating in Britain was 834, averaging less than five minutes each.

The American Telephone & Telegraph Co. issued the following statement:

"Commercial profit was not a consideration in the entrance of the American Telephone & Telegraph Co. into the Atlantic telephony field. Progress in this field has been made slowly, for the reason that the public has not adjusted itself readily to direct telephony between Europe and America.

No profit was expected in the first years of the service. The telephone is a service and not a business. The Atlantic telephone service is an experiment.

Calls on the telephone service across the Atlantic average from eight to ten a day, or about five times the volume of traffic transmitted over the transcontinental service when it was started in 1915 between New York and San Francisco."

The objection that the rate of $75 for the first three minutes is prohibitive has been considered by the company, it was said, but the experience so far does not justify a change in rates.

The transcontinental telephone service in this country, inaugurated in 1915, did not prove commercially successful for several years. At the present time, however, three transcontinental circuits are being extensively used.

Even if the service never becomes self-sustaining it probably will be continued, the company said, because it believes the service should be kept available for those who want it.

The American investment greatly exceeded the $2,400,000 spent by the British in establishing the service, it was said. All of this equipment was designed on this side.

Annual Meeting and Convention on South Dakota Association.

The annual meeting and convention of the South Dakota Telephone Association will convene at the Marvin-Hughitt Hotel, Huron, January 10, 11 and 12, 1928.

The program provides for four or five good speakers and the rest of the time will be devoted to discussing our problems through the medium of round table discussions. These discussions will be led by men who are experts in the particular line under discussion. The officers felt that the members of the association would get the most good out of such a program because there would be excellent opportunities to bring up problems for discussion which the telephone companies of the state must meet.

"The thing that I wish to impress on every telephone man in the state," says President Ira S. Burnett, "is the fact that our meetings are open to all. Non-members are not only invited, but I urge them to attend regardless of their property size."

The banquet and dance will be held on the evening of the second day of the convention, January 11. The officers are doing everything in their power to make the convention interesting and of value to everyone who attends.

Proposed Consolidation Involves Four Kansas Companies.

Consolidation of four Kansas telephone companies, to be known as the American Telephone Co., of Abilene, Kans., is provided in a charter recently granted by the charter board.

The reorganized American Telephone Co., capitalized at $500,000, proposes to absorb the Northeast Kansas Telephone Co., the Wabaunsee Telephone Co., the Westmoreland Telephone Co., and the old American Telephone Co.

The incorporators of the new American Telephone Co., are George P. Taylor, L. O. Verckler, W. M. Irwin, J. E. Flint, and the combined assets of the various properties equal the amount of capitalization, $550,000.

Dates for the Texas and Oklahoma Conventions.

An error was made in the information furnished TELEPHONY regarding the dates of the annual convention of the Texas Independent Telephone Association. It will be held March 20 to 23 inclusive at the Texas Hotel, Fort Worth.

The annual convention of the Oklahoma Utilities Association has been scheduled for March 13, 14 and 15 at Tulsa.

Here and There in Telephone Work

Salvaging Copper Wire Replaced by Modern Toll Cable.

Interesting methods were used by the Pacific Telephone & Telegraph Co. for salvaging 70 lines of copper wire, which were replaced by modern toll cable erected between Berkeley and Crockett, Calif.

A special winch, mounted on a caterpillar tractor, was developed for the particular purpose of salvaging wire. After the wire had been taken down and thrown on the ground, the caterpillar pulled up to it and the wire was started on the special winch, one roll being on each side of the caterpillar. About three-quarters of a mile of wire was wound at one time.

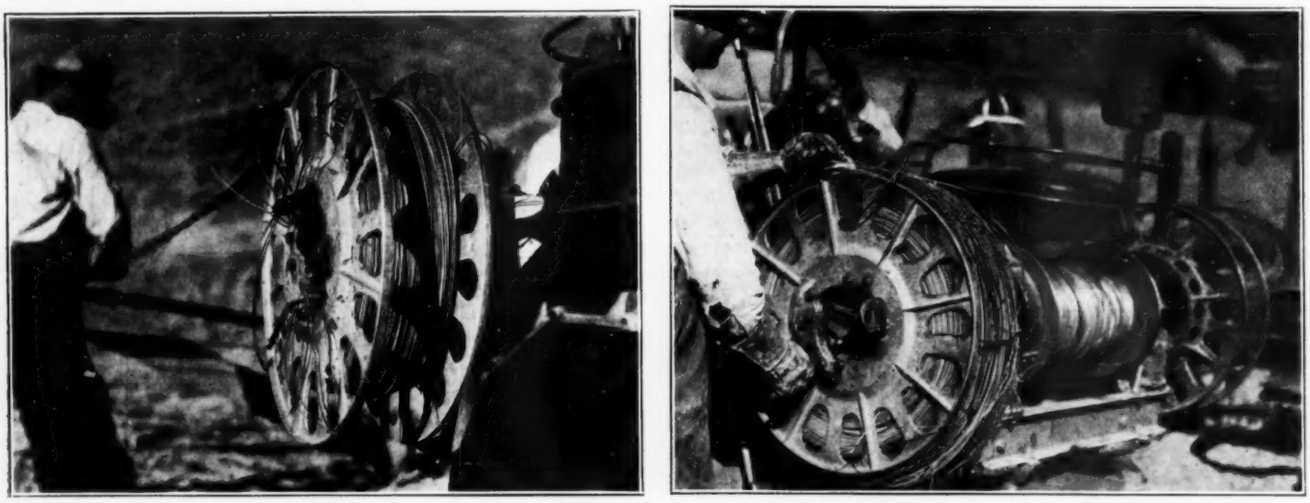
The winch consisted of a center drum for holding cable and two outside drums used for winding the wire into coils. These outside drums have a capacity of approximately 350 pounds of copper wire each and both may be wound at the same time. Each of these outside drums are made with a bevel which permits of the wire being easily removed, no matter how tightly wound. The outside flanges are easily removed when the coil is ready to come off the drums. Tie wires are placed on the reels before the wire is wound and these are pulled up around the coil before it is removed from the drum.

The caterpillar provided ample power for winding both drums at the same time, even when as high as 70 wires were being wound at one operation, and often these wires had a length of three-quarters of a mile. Power is supplied to the winch from the rear power take-off by means of a silent chain. The front part of the caterpillar carries under the radiator a counterweight weighing some 400 pounds, which offsets the weight of the winch on the rear.

With this outfit, the average amount of copper wire salvaged per day was from 3,000 to 5,000 pounds and this was over a country which is particularly broken, consisting of high hills with very steep hillsides.

The caterpillar is also equipped with two arms to which is attached a pair of scales for the weighing of each coil before being placed on the trailer which the caterpillar transports to a point where trucks can negotiate.

One of the accompanying illustrations shows how the wire is pulled up by the winch on the caterpillar and wound on the reel and the other shows a full reel. In this the operator's right hand is shown unlocking the end of the reel, to permit the removal of the bundle of wire. The wires used for tying the coils up are also shown. While the wire is being wound on the drum, the ends of the tie wires are fastened to the frame work.



View of One of Reels Showing Bundle Tie Wires Attached to Frame of Reel.—Wire Tied Ready to Remove from Drum of Reel.

First Cable Placed in Trench in Ohio River Bed.

The first submarine telephone cable crossing the Ohio River at any point, to be used for transmitting telephone conversations between subscribers served from different central offices was laid recently for the Cincinnati & Suburban Bell Telephone Co. For about ten days a dredging company worked preparing the trench under water in which the cable was to be placed. One day was required to lay it.

The cable contains 408 wires, over which telephone calls amounting to more than 2,600 daily will travel between Ft. Thomas telephone users served from the Hiland central telephone office and those subscribers served on the Ohio side through the Avon, University, Woodburn, Norwood, East, Madisonville, Kirby and Valley central offices. Calls for Ash, Glendale, Madeira and other suburban subscribers also will be routed this way.

This cable, five inches in diameter, is 2,200 feet long and weighs 28½ tons. The telephone wires are protected by an armor of heavy lead sheath and alternate wrappings of jute and steel. It was laid in accordance with United States government specifications, five feet below the river bed, from a point at the foot of Congress street, Cincinnati, near the East central office to a point about a mile north of Dayton, Ky.

Early in 1926 the telephone engineers' studies of the number of calls made between the telephone subscribers living in the districts named, indicated that additional interoffice facilities were necessary in the near future in order to furnish adequate service. As the route over which the submarine cable could be used would save seven miles in distance between the Hiland and East central offices it was decided to use it in preference to adding a new cable to the present cable group which is routed across the suspension bridge.

Saving Money in the Purchase of Materials and Supplies.

By J. B. Haley.

Every telephone convention and every district meeting seems to have something of interest regarding the ability of the telephone company to increase revenues without increasing expenses. The subjects of plant, maintenance and traffic have been given wide discussion, but the subject of the purchase of materials has been left almost entirely up to the individual.

Every manufacturer and supplier knows the lack of cooperation on the part of the telephone men to keep down the cost of

producing and selling equipment and supplies. The most common case with which we shall deal in this article will be the question of quotations for pole line hardware and other like material. A typical request follows:

Please furnish best prices on the following list of materials:
75 1-bolt guy hooks.
50 3-bolt clamps.
60 10-pin arms.
120 braces.
65 guy rods.
200 lag screws.
175 carriage bolts.
400 square washers.

This request is forwarded to the usual number of suppliers with which the telephone man is familiar. When he receives the prices, he invariably finds a difference in the high and low bids of from, say, $75 to $135.

Without further thought, he places the business with the lowest bidder, feeling perhaps that he has been favored with an unusual price because he is friendly with the man who travels that territory, or that the size of his exchange warrants going low to get his business. This may occasionally happen, but generally is not the case at all.

The truth of the matter is that this buyer has not specified what he believes correct for his particular plant on any of the items. There being several sizes and weights of each, he has received the smallest and lightest on the list—and this was the reason that the supplier was able to make the attractive price. Even though the buyer is aware of the difference in materials, it is false economy to purchase the cheapest, for the best materials will bring the highest rates and the greatest pride to the exchange in the end.

In connection with the request for quotations, it occurs to the writer that, for the average routine supplies for maintenance, it is an unwarranted and expensive action to ask the suppliers for quotations on small amounts of material. This industry is very fortunate in having high class, reputable concerns to deal with and, if it is evident that an unusual price has been charged, any one of them can easily adjust the matter to the satisfaction of the buyer.

This brings up the lack of good business practice in handling that part of a telephone exchange and keeping some sort of record of materials and supplies purchased, in order that prices may be compared quickly and adjustments secured readily. There are two salient reasons for having orders made clear and not waiting for quotations on small items:

Very few of the smaller exchanges maintain a stock of materials that would replace most anything that is lacking. From years of experience on the road, the writer has found that few orders are placed until the materials are actually needed, so that some consideration must be given to the loss of time due to receiving the wrong materials.

One of the largest suppliers keeps a fine record of claims, which indicates that 65 per cent of claims are due to the wrong information being given, either by its salesmen or the telephone men in ordering. These claims cost considerable money, and, of course, they are reflected in the prices which the purchaser must pay.

There is another phase that the men in the field and the salesmen also seem to forget—and that is "the way to ship." Since the advent of parcels post a great deal of money could be saved, and a great deal of time could be dispensed with, if some consideration would be given this means of transportation. For instance, very few telephone men know that a cable terminal, without stub attached, can be shipped quicker and cheaper by parcels post. How many telephone companies buy inside wire in such quantities that it would not be better and cheaper to ship it parcels post?

In summing this up it is hoped that this article will have some effect upon the relations between the suppliers and the buyers, in that when the telephone man opens up the boxes which the drayman has delivered to him a few mornings after the visit of the salesman, or the placing of his order by mail, and then goes out to put an arm on a bracket lead already established, he will find that the lag bolts and the carriage bolts are not too long, and that the braces are consistent with the size of the arm.

Subscribers Allowed Window Displays at Telephone Office.

"We have in our western area an activity—the window display activity, founded on a small scale, that is now paying large dividends," writes W. L. Lees, service supervisor at Pittsburgh, Pa., of the Bell Telephone Co. of Pa., in The Telephone News. "As far as can be seen no seasonal fluctuations appear to affect the industry, nor is it concerned about strikes, labor conditions, etc., but will continue to operate at full capacity and pay dividends 12 months out of the year.

"A resume of the life of this activity seems to indicate that it was more or less a process of evolution. At first our windows were used merely as a means of admitting God's air and sunlight. Later, it was discovered that in addition they could be used advantageously as an agency for imparting knowledge to a telephone using public. So our company posters were displayed therein.

Later the window was given over to the use of business subscribers for displaying their products and tying in with the telephone by telling how it is used in the conduct of their businesses.

This plan had been previously introduced in Philadelphia where it proved most successful. That the plan is equally successful in Pittsburgh, is indicated by the long waiting list of subscribers who wish to use the window.

One of Series of Displays in Grant Building Window in Pittsburgh by Business Subscribers of Bell Telephone Co. of Pa. Each Display Along with Exploiting the Wares of the Subscriber Tells How Telephone Is Used in That Business. Subscribers Usually Give Their Telephone Numbers and Urge Telephone Shopping.

When the activity was started, a schedule was drawn up allotting different periods to each of the districts, each district to be responsible for the display in the window for only one two-week period at a time. This schedule gave the districts advance knowledge as to just what periods throughout the year they would be responsible for having a display in the window, and allowed them to arrange with their subscribers accordingly. The only times not allotted to the various districts were the different holiday periods; these being retained by our company for patriotic display.

The total number of firms having had displays in our window since January 1, 1927, is 17, while the number at present on the waiting list is many more. To show that these displaying firms are representative firms the Westinghouse Electric & Manufacturing Co., Pittsburgh Chamber of Commerce, Crescent Portland Cement Co. and Pittsburgh Dairy Council might be mentioned.

Any firm having a legitimate article to market, or any worthwhile organization advancing a worthy cause for the benefit of the public, may now have the use of our window for the asking, the only stipulation being that in case of a firm display, our company asks that the display be in some way tied in with the telephone service; this usually being accomplished by means of placards and telephone instruments.

This activity is paying large dividends to its promoters. What bearing it will have on our company's revenue will be hard to estimate or determine, but it is a safe guess that much is being accomplished."

What the Commissions Are Doing

Up-to-the-Minute News Regarding the Activities of State and Interstate Commissions, Courts and City Councils in Matters Concerning Telephone Companies—Summary of Commission Orders and Schedule of Telephone Hearings

Ask Commission to Investigate Rates Claimed Excessive.

John Francis Neylan, Grove J. Fink, John B. Costello, Dion R. Holm, special counsel for the city and county of San Francisco, Calif., and the city attorneys of the cities of Piedmont, Berkeley, Oakland, Alameda, San Leandro, Albany and others representing organizations of telephone users, have filed a complaint with the California Railroad Commission against the American Telephone & Telegraph Co., The Pacific Telephone & Telegraph Co. and the Western Electric Co., alleging that these three companies, which are designated "The Associated Companies," are in fact furnishing telephone service in the San Francisco Bay area through the agency of the Pacific Telephone & Telegraph Co., and alleging that the present rates charged by the latter company are excessive and unreasonable, and asking the commission to conduct an investigation with the view to reducing them.

It is alleged in the complaint that the American Telephone & Telegraph Co. and the Western Electric Co. are as much concerned with rendering telephone service in the San Francisco Bay district as the Pacific company, and the petitioners ask the commission to order those companies to submit to the commission's jurisdiction, and to produce all facts necessary to a proper hearing of the case.

The same complainants also have filed with the commission a petition in intervention in the pending proceeding involving an application of the Pacific Telephone & Telegraph Co. for an increase of rates, and the request that the other companies named be forced to participate in the hearing of the telephone company's application and to submit all necessary facts for a proper investigation of the relations of those companies.

Transfer of Two Small Missouri Properties Authorized.

The Missouri Public Service Commission on December 22 authorized W. W. Tracy to transfer to Mrs. E. B. Hall all of the property of the Wellsville Mutual Telephone System and the Martinsburg Telephone System located at Wellsville, Mo., and Martinsburg, Mo., together with all franchise rights and contracts in connection with the operation of the systems and plants and all property used and useful in connection therewith, at an agreed price of $5,000. Mrs. E. B. Hall was authorized to maintain and operate the telephone system transferred.

No formal hearing was held on the joint application for the transaction. The mayors of the two communities concerned wrote letters to the commission stating that there was no objection to the transfers.

Asks Increased Rates for Rural Service Charge.

The Arkansas Railroad Commission has taken under advisement the petition of the Berryville Telephone Co. for authority to increase its service charge to rural patrons from 25 cents to 50 cents a month. About 200 telephones would be affected.

The patrons own their lines and residence sets, but obtain switchboard service through the Berryville company.

Approval Sought for Purchase of Missouri Properties.

The Central West Telephone Co., of Linneus, Mo., has filed an application with the Missouri Public Service Commission for authority to purchase the telephone properties of the Missouri Valley Telephone Co. in Brunswick, Dalton, Triplet, Keytesville, Indian Grove and Montgomery City.

The Central West Telephone Co. said it desired to purchase all of the outstanding stock of the Missouri Valley company for $130,000. The plants in Linn county were sold only a few months ago to the Missouri Valley company.

Mutual Association Sells Lines to Bell Company.

The Northwestern Bell Telephone Co. and the Sarpy County Mutual Telephone Association have joined in an application to the Nebraska Railway Commission for approval of a deal made by which the latter is to retire from the field of operations. At the present time it owns farm lines running into the towns of Papillion and Springfield where the Northwestern Bell has exchanges.

The property consists of 28 miles of wire, nearly 400 poles and six subscriber sets, and the Bell agrees to purchase the entire equipment. It will rebuild the farm lines and serve the present company's patrons with rural service at the standard rate.

The construction of a number of heavy voltage transmission lines by power companies into the territory has made necessary a reconstruction of the mutual association lines. These are 20 years old, nearly worn out and in sad need of replacement. The association says that its members do not care to accept the financial responsibility of giving efficient service, and are willing to retire from the business and take the Bell service.

Transfer of Property at Huntsville, Mo., Authorized.

The Missouri Public Service Commission recently authorized J. O. Kent of Huntsville to purchase, maintain and operate the telephone exchange property in and about the city of Huntsville, formerly owned and operated under the name of Huntsville Telephone Co. by a co-partnership composed of J. H. Stone, R. S. Tucker and Nunely H. Stone, at an agreed consideration of $26,000.

The commission was informed by the mayor of Huntsville that there was no objection to the sale of property.

J. O. Kent was authorized to deliver 27 notes of the aggregate principal amount of $14,400, the notes to be dated January 1, 1928, to bear interest at the rate of 7 per cent per annum, payable semi-annually. To secure the payment of the notes, he was authorized to deliver a mortgage to be dated January 1, to be given to W. M. Evans of Randolph county as trustee.

Commission Not Authorized to Fix Wages of Utility Employes.

The Nebraska State Railway Commission says that it has no authority to fix the rates of wages that public utility companies must pay, and that, therefore, it cannot make a condition of the rate raise allowed the Lincoln Telephone & Telegraph Co. that it increase the wages of its chief operator as asked for by the subscribers at its Murray exchange. It passes the request of the patrons along with the hope that the company may be able to make such arrangements as will comply with the wishes expressed by them.

The company was allowed to charge $3 a month for business service, $1 for business extensions, $2 for individual residence, and $1.75 for party residence and rural service, when the service has been changed from grounded to metallic.

The patrons were willing to pay the rates suggested, if their service was put on the higher plane suggested, but they sought to condition their approval on the company paying the chief operator more than the $85 a month it now compensates her for looking after the exchange at all hours, supplying a relief operator when necessary, and looking after the records and making all collections. She lives in the house

owned by the company and used as an exchange, and supplies light and heat.

They said that this put too much of a burden upon her, and that the consequence was that although they were supposed to have 24-hour service, they forbore from calling her up after bedtime had arrived, save on the most urgent of occasions. Commissioner Curtiss, who wrote the order, says that this is a most unusual tribute thus paid to a faithful and loyal public utility officer.

The order enters upon a dissection of the accounts of the exchange, and the revenues to be expected, and finds that the new rates will not give to exceed 4 per cent on the present fair value of the property. The theory of regulation is that the public hires a utility company to perform certain services public in their nature that it does not wish to do for itself, and that it must pay a reasonable wage in the form of a reasonable return on the money invested after all expenses and allowances for wear and tear have been calculated.

At one time members of the commission sought to fix a standard of wages for some utilities, on the theory that if the public wants the men and women working for a utility to get better wages than is possible under the rates charged for service and the return on the capital these give, it should be willing to pay higher rates—and that that was the only way it could be done. The commission never went farther than a tentative order in a street railway case, and now holds that its only jurisdiction over wages of utility employes is conferred when these are so high that they place on the public a higher rate burden than it should bear.

Commission Approves Common Stock Issue of New Jersey Bell.

Issuance of $3,250,000 of common stock of the New Jersey Bell Telephone Co. was sanctioned December 10 by the New Jersey Public Utility Commission. The stock will be transferred to the New York Telephone Co. in payment for property installed in New Jersey between January 1 and October 1.

An understanding was reached at the time the New Jersey company acquired the property in New Jersey of the New York utility that the $72,416,000 worth of stock then authorized would be necessary to cover new installation costs, and the added issue is in keeping with that agreement.

More Cities Ask for Telechronometer Measured Service.

With the filing in the Washington Department of Public Works of a petition by 30 patrons of the Pacific Telephone & Telegraph Co. in Bellingham, Wash., asking installation of the telechronometer method of measuring telephone use, 13 cities have asked such service, C. Rea Moore, supervisor of public utilities, declared on December 10.

Pressure of other business will not allow a hearing on the petition before next summer, Mr. Moore said. A public utility company is given 30 days, usually, in which to give reasons for not furnishing the service desired.

The 13 cities that have petitioned for the telechronometer system are Centralia, Chehalis, Vancouver, Kelso, Longview, Seattle, Tacoma, Spokane, Aberdeen, Hoquiam, Walla Walla, Yakima and Bellingham. Everett has used the system for some time.

The telechronometer system has been in use in Everett as an experiment since 1920 by the Puget Sound Telephone Co. and in 1926 was installed in all service in that city. By this system telephone calls are metered by instruments similar to gas, electricity and water meters.

Compromise on New Rate Schedule in Clarksville, Tenn.

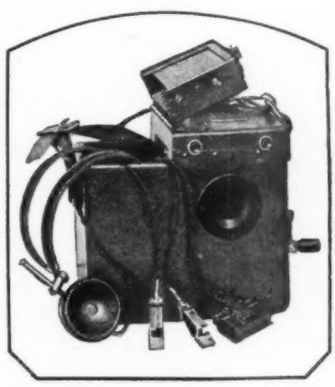
Rental increases ranging from 25 cents per month on one-party residence telephones to $1 on one-party business lines become effective January 1, as a result of a compromise agreement with the Christian-Todd Telephone Co. adopted December 12 by the Clarksville, Tenn., Chamber of Commerce on recommendation of its in-

Eliminate Wire Cutting

Trouble hunting should not be destructive. Opening lines is an impractical method of making tests for trouble. Most companies prohibit wire cutting, but without a West Test Set it is hard to eliminate this practice.

With a West Test Set all tests may be made without cutting the line. The trouble tone is picked up inductively with the small finder coil clamped over the line wire. By simply turning the generator crank the direction of the trouble is indicated.

The West Test Set is a modern combination telephone and test set, made only of standard telephone parts. No buzzers or batteries are required for the test tone. It has a rugged strength that carries it through long, hard wear, and makes it a profitable investment for every telephone company.



Send for Bulletin illustrating and describing every test that can be made with this efficient device.

American Electric Company, Inc.

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The West Test Set

It is a mark of distinction to say, "I saw it in TELEPHONY."

vestigating committee which, on November 30, went over the books of the telephone company in Hopkinsville, Ky. Under the agreement, messages through exchanges in the rural districts of the county will continue free of charge and city and county officials will continue to enjoy free service in their offices.

The compromise, the committee set out in its lengthy written report, will result in a saving of $3,500 over the proposed gross increases asked by the company which would have totaled $10,435.44 per year. The new rates will increase the company's income in Montgomery county in 1928 by some $6,925. The gross income will not exceed 5.25 per cent of the capital invested, it is pointed out, whereas it is entitled to a net earning ratio of 8 per cent. A petition the telephone company filed with the Tennessee Railroad and Public Utilities Commission for permission to increase its rates will be withdrawn.

Under the compromise the one-party line business telephone will be increased from $4 to $5, the two-party business line from $3.50 to $4.25, five-party business line from $1.50 to $2; one-party residential telephones from $2.50 to $2.75; two-party lines from $2 to $2.75 and five-party lines from $1.50 to $1.75 per month.

New Rates Schedules Allowed Upon Showing of Low Return.

The Random Lake Telephone Co. operating in Random Lake, Batavia and Belgium, Wis., has been authorized by the state railroad commission, to place in effect an increased schedule of rates.

At the hearing the company submitted exhibits showing the operating results for the first ten months of the year 1927, the balance sheet of the company as of October 31, 1927, a valuation of the property and a schedule of the revenues under the present and proposed rates.

The balance available for depreciation and return computed by the commission from the operating figures submitted amounted to $2,873.13, which is at the annual rate of $3,450.

Using the book value of the property which appeared reasonable to the commission with an adjustment of one item, the rate base for the purposes of this case was set at $52,528 upon which the company is entitled to earn $6,350 per annum for depreciation and return.

"As the company is earning only $3,450 per annum under the present rates for depreciation and return," says the commission, "it is entitled to an increase in revenues of about $2,900 per year. The rates which the company proposes would yield a considerably higher increase and, therefore, cannot be approved. In the following order we have provided rates that will yield the company adequate revenues and will permit of the furnishing of proper service."

The schedule of old and new monthly net rates follow:

	Old	New
Local Service:		
Business, one-party	$1.75	$2.50
Business, two-party	1.50	2.00
Residence, one-party	1.50	2.00
Residence, four-party	1.25	1.50
Rural Service:		
Business	1.50	2.00
Residence	1.50	1.75
Miscellaneous Equipment:		
Extension telephones, business	.50	1.00
Extension telephones, residence	.50	.75
Residence desk sets, additional		.15
Rural desk sets, additional		.25
Extension bells within same building	.25	.25

Summary of Commission Rulings and Schedule of Hearings.

INTERSTATE COMMERCE COMMISSION.

January 4: Hearing in the matter of the application of the Mountain States Telephone & Telegraph Co. to purchase the properties of Ida A. Van Dyke and Cleve W. Van Dyke, doing business as the I. A. Van Dyke Telephone Service, Miami, Gila county, Arizona, for which the Mountain States company agrees to pay the sum of $26,500.

CALIFORNIA.

December 19: Complaint filed by John F. Neylan, Grove J. Fink, John B. Costello, Dion J. Holm, special counsel for the city and county of San Francisco, and the city attorney of Piedmont, Berkley, Oakland, Alameda, San Leandro, Albany, and others representing organizations of telephone users, against American Telephone & Telegraph Co., the Pacific Telephone & Telegraph Co. and the Western Electric Co., alleging that these three companies are in fact furnishing telephone service in the San Francisco Bay area through the agency of the Pacific Telephone & Telegraph Co., and alleging that the present rates charged by the latter company are excessive and unreasonable, and asking the commission to conduct an investigation with the view to reducing them.

ILLINOIS.

December 1: Order approved authorizing the Tower Hill Telephone Co. to sell, and the Illinois Southeastern Telephone Co. to purchase all the property and assets of aforementioned company for the consideration of $10,000; and granting to the purchasing company a certificate of convenience and necessity to operate and maintain the telephone property authorized to be transferred.

December 1: Order approving intercorporate agreement dated October 29, 1927, between the Illinois Southern Telephone Co. and the Norris City Co-operative Telephone Co.

December 1: Order approving intercorporate agreement dated October 25, 1927, between the Illinois Bell Telephone Co. and the Streator Telephone Co.

December 7: Order approved authorizing the Westfield-Kansas Telephone Co. to place in effect the schedule of rates on file with the commission designated as Ill. C. C. No. 3, sheets 1A and 2A, involving a general increase in rates for all classes of telephone service in Westfield, Clark county, and in Kansas, Edgar county and vicinities, effective January 1, 1928, providing written notice of the effective date is filed with the commission within five days of the service of this order, or effective at any subsequent date providing written notice of the effective date is filed with the commission not less than ten days prior thereto.

December 7: Order approved authorizing the Crescent Telephone Co. to place in effect schedule of rates on file with the commission designated as Ill. C. C. No. 5, increasing switching service rate from $5.00 to $6.00 per annum in Erie and Hillsdale and vicinities, Whiteside and Rock Island counties, effective January 1, 1928, providing written notice of the effective date is filed with the commission within five days of service of order, or effective at any subsequent date providing written notice of the effective date is filed with the commission not less than ten days prior thereto.

December 7: Order approved authorizing sale by the Illinois Bell Telephone Co. and purchase by the Western Union Telegraph Co. of certain underground conduit facilities in the city of Decatur, for the sum of $15,000.

December 7: Order approving lease by the Chicago, Burlington & Quincy Railroad Co. to the Illinois Bell Telephone Co. of land in Rock Island county for a term of five years, at a rental of $60 per year.

December 7: Order approving lease by the Chicago, Burlington & Quincy Railroad Co. to the Illinois Bell Telephone Co. of land in Rock Island county, for a term of five years, at a rental of $180 per year.

December 7: Illinois Southern Telephone Co.'s rate schedule Ill. C. C. No. 1, applying to Enfield, Ill., effective November 1, 1927, presented to commission but no action was taken.

December 14: Petition granted of Rossville Telephone Co. for a rehearing in the matter of proposed advance in rates for telephone toll service between the company and other exchanges stated in rate schedule Ill. C. C. No. 1 of the Rossville company at Rossville, Alvin, Bismarck, Henning and Jamesburg, Vermilion county.

December 14: Order citing the Independent Telephone Exchange, B. C. Noble, owner, to appear before the commission at its offices in Chicago on Wednesday, January 24, 1928, to show cause why improvements should not be made in equipment and methods of operation necessary to render service that reasonably meets the requirements of this commission's general order No. 107.

December 15: Order approved suspending until April 26, 1928, proposed rates for telephone service in Cedarville and Lancaster townships, stated in rate schedules Ill. C. C. No. 3 of the Lancaster & Cedarville Telephone Co.

December 15: Order suspending until April 23, 1928, proposed rates for telephone service in Pearl City, Lena and McConnell, state in rate schedules Ill. C. C. No. 3, of the Pearl City Independent Telephone Co.

December 15: Schedules submitted to commission but no action taken as follows: Wessel & Mann Telephone Co.'s rate schedule Ill. C. C. No. 1, sheet No. 4, applying to telephone rates at Loraine.

Teutopolis Telephone Co.'s rate schedule Ill. C. C. No. 1, applying to toll service in Teutopolis, Effingham county and vicinity.

KANSAS.

December 14: Applications filed asking authorization of the sale of the telephone plant and property of the Mulvane Mutual Telephone Co. at Mulvane to W. A. Cales, and a permit to operate it as a public utility.

December 15: Lewis A. Chaney, owner of the telephone plant and property at

Mound Valley, in Labette county, filed application asking commission to approve the sale of the exchange to the Midland Utilities Co., just organized. Mr. Chaney also is president of the Midland Utilities Co., which also filed an application for permission to issue $2,000 worth of common stock, $8,000 worth of preferred stock, and $20,000 in bonds. The proceeds of the sale of these securities are to finance the transfer of the property and provide for improvements to the telephone system.

MINNESOTA.

January 17: Hearing in the matter of the application of the Lake Park Telephone Co. for authority to change its schedule of rates at Lake Park.

January 18: Hearing in the matter of the application of the Shevlin-Itasca State Park Cooperative Telephone Co. and the Garden Valley Telephone Co. for approval of the sale and transfer of the property, rights and franchises of the Shevlin-Itasca State Park Cooperative Telephone Co. to the Garden Valley Telephone Co.

MISSOURI.

December 17: S. H. Coffman authorized to sell and A. E. Long to buy all of the property of the Newberg Telephone Exchange at Newburg for $15,000.

December 16: Application filed for approval of sale of properties of the Missouri Valley Telephone Co., Brunswick, which operates exchanges at Brunswick, Dalton, Triplett, Keytesville, Indian Grove and Montgomery City to the Central West Telephone Co. for $130,000.

December 22: Joint application approved of W. W. Tracy of Elden, owner of the Wellsville Mutual Telephone System and the Martinsburg Telephone System to sell and of Mrs. E. B. Hall of Wellsville to purchase the systems; Mrs. Hall is also authorized to operated and maintain the systems. Order is effective in ten days from date.

December 22: Operation of proposed increased rates of Oak Grove Home Telephone Co., Oak Grove, suspended for a period of 120 days from date to April 20, pending a hearing by the commission.

NEBRASKA.

December 20: Application of the Grant Telephone Co. for authority to charge gross and net rates found reasonable, and authority issued.

December 21: Complaint filed by W. J. Busch against Stanton Telephone Co., alleging excessive charge made as cost of installation of stub line.

December 21: Application of the Farmers Independent Telephone Co., of Platte Center, for authority to charge gross and net rates, found reasonable and authority issued.

December 22: Application filed by the Northwestern Bell Telephone Co. and the Sarpy Mutual Telephone Association for approval of purchase by the former, of rural lines of the latter attached to the Bell company exchanges at Papillion and Springfield.

December 24: In the matter of the application of the Lincoln Telephone & Telegraph Co. for authority to increase rates at its Murray exchange; proposed schedule found reasonable, and authority issued to charge it whenever the service is changed from grounded to metallic.

NEW JERSEY.

December 10: Approval given the issuance of common stock of the New Jersey Bell Telephone Co., to the amount of $3,250,700 par value. The stock will be transferred to the New York Telephone Co. in payment for expenditures made by the latter in New Jersey between January 1 and October 1.

OHIO.

December 15: Application filed for the reorganization of the Pomeroy & Middleport Telephone Co. under the name of the Pomeroy & Middleport Telephone Corp. The new corporation is to pay $185,000 for the former company in the form of $125,000 6 per cent preferred stock, $50,000 of seven per cent preferred stock and 100 shares of no par common stock.

OKLAHOMA.

December 27: Hearing on application of Southwest Telephone Co. for increase in rates at Meeker.

WASHINGTON.

December 9: Patrons of the Pacific Telephone & Telegraph Co. at Longview, Kelso, Vancouver, Chehalis and Centralia added their petitions for telecronometer measured service to those now in the department of public works from Seattle, Tacoma, Aberdeen, Hoquiam, Yakima, Walla Walla and Spokane.

WISCONSIN.

December 20: Consolidated Telephone Co. of Wisconsin authorized to increase rates at its Mishicot, Colby and Abbotsford exchanges. They are effective at Mishicot and Colby next regular billing date and for Abbotsford the first regular billing date following change to common battery service.

December 20: Random Lake Telephone Co. authorized to increase its rates.

December 20: Cascade Telephone Co. granted authority to increase rates for service and after January 1.

December 20: Tri-County Telephone Co. authorized to place in effect January 1, a new schedule of rules and increased rates.

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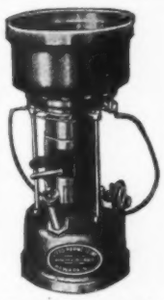

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Condensed Telephone News

Officers of Companies Are Urgently Requested to Forward to Us Promptly All Financial and Other Statements as Soon as Issued and Any Items Relating to Construction, Rebuilding, or Changes in Their Plants and Systems

Incorporations and New Telephone Companies.

CLAYTON, ILL.—Papers of incorporation were issued to the Clayton Telephone Co. recently by the secretary of state. The firm, capitalized for $5,000, will construct and operate a telephone exchange and lines. C. E. Cain, J. L. Tarbox and J. S. Wallace are the incorporators.

PETERSBURG, IND.—The Telephone Construction & Distributing Co. has been incorporated here with a capital stock of $10,000. The incorporators are Charles R. Head, Larrentus L. Dearing, Lawrence G. Weaver, L. Carol Thomas and James R. Head.

NEW MARKET, IOWA.—A corporation charter was issued by the secretary of state recently to the New Market Telephone Exchange of Taylor county. The capital stock is $10,000.

WELSH, LA.—The Rowland Telephone Co., Inc., with a capital of $30,000, has been chartered by W. C. Rowland and Mrs. E. Rowland.

WATERVILLE, N. Y.—Incorporation papers have been filed in the county clerk's office at Utica for the Stockwell Telephone Co., Inc. The new company capitalized at $500 proposes to establish telephone lines in the towns of Sangerfield, Oneida county, and Brookfield, Madison county. The directors are George H. Jackson, Harry R. Myers and Clark M. Brainard, all of this city, where the company's headquarters will be.

ASTORIA, ORE.—The Lewis & Clark Cooperative Telephone Co. has been incorporated by L. E. Wilson, F. H. and M. J. Johnson, with a capital of $1,500.

WILLIS BRANCH, W. VA.—The Southern West Virginia Telephone Co. has been incorporated with a capital stock of $150,000 by H. H. O'Neal, Leslie L. O'Neal, H. H. Kidd, Janie Kidd, Willis Branch; M. F. O'Dell and Ida S. O'Dell, Beckley.

Franchises.

WILSON, N. C.—This city has granted a 30-year franchise to Carolina Telephone & Telegraph Co., Tarboro, to install underground cables and wires, etc.

Financial.

PEKIN, ILL. — Middle States Telephone Co. has increased its capital stock from $200,000 and 3,000 shares non par value to $300,000 and 5,000 shares non par value.

INDIANAPOLIS, IND.—The Indiana Bell Telephone Co. has increased its capital stock from $27,000,000 to $30,000,000.

DETROIT, MICH.—The Michigan Bell Telephone Co. has increased its capitalization from $50,000,000 to $85,000,000.

Elections.

MARTINSDALE, MONT.—At a meeting of the directors of the Delpine Telephone Co. the following officers and directors were elected: Sanford Holliday, president; R. A. Martin, vice-president; W. B. Galvin, secretary and treasurer; John Duncan and Henderson Coates, directors.

GARDNERVILLE, NEV.—At the election of officers of the United Farmers' Telephone & Telegraph Co., the board of directors, which has held office for many years, was re-elected, and consists of the following: E. Christensen, F. Schacht, R. W. Bassman, E. J. Phillips, and Wm. Park.

PLEASANT SHADE, TENN.—The Pleasant Shade Home Telephone Co. held its annual meeting recently. The present officers, who are Herman Gregory, president; G. W. McDonald, vice-president, and W. C. Smith, secretary and treasurer, were re-elected. Ben Beal, Jerome Beasley and Ray Kittrell were elected as directors to take the places of H. E. Porter, G. C. Earps and W. J. Nixon.

Charles McCall was retained as manager and operator.

Construction.

LOS ANGELES, CAL.—The Pacific Telephone & Telegraph Co. has started work on the placing of 728 telephone poles and 359 miles of copper circuit between Los Angeles and Santa Maria as part of the long-distance line between the two points. The project is to be completed by April 30, 1928, and will represent an expenditure exceeding $127,700.

DUQUOIN, ILL.—The Southern Illinois Telephone Co. is considering the construction of a new telephone line between this city and Elkville, eight miles to the south. The present line has been in use for many years, and, in addition to being crowded by the constantly increasing traffic between the two towns, is parallel to a high-tension line owned by the Illinois Power & Light Corp., which makes satisfactory service impossible.

CASSVILLE, MO.—The telephone poles, cables and wires have been taken off of the streets around the public square here by the Cassville Telephone Co., and the wires have been installed underground. This has greatly improved the appearance of the square.

SUSSEX, N. J.—The Farmers' Union Telephone Co. has let a contract for the construction of a two-story four-room building for its new exchange, which will be ready for occupancy in early spring.

TIFFIN, OHIO.—The Tiffin Consolidated Telephone Co. early next year will begin construction on a new office building. Officials said a $100,000 building will be built on the lot recently purchased, which has a 60-foot frontage. Architects and engineers are already at work, planning the building, which is required to meet larger business demands.

Miscellaneous.

RUTLAND, ILL.—James L. Kirk has sold the Central Illinois Independent Telephone Co. to the Paul C. Dodge Co. of Chicago, and possession is to be given January 1. This telephone company includes the exchanges at Rutland, Wenona, Dana, Long Point, Magnolia and Toluca.

BLUFFTON, IND.—A deal is announced in which exchanges and lines of the Mt. Zion Telephone Co., extending to points in Wells, Jay, Huntington and Blackford counties, have been sold to the Goodrich interests of Indianapolis. E. P. Miller of Warren has been head of the Mt. Zion company for a number of years.

WEST LAFAYETTE, IND.—J. C. Dixon of West Lafayette has bought the New Richmond telephone system from J. L. McNeil and will take possession on February 1, 1928.

THAYER, KANS.—A contract was signed recently whereby the Thayer Telephone Co., owned and operated by J. E. Christie for the past many years, is sold to Lewis A. Chaney of Abilene, formerly owner of the Midwest Telephone Co., which operated a number of plants. The contract states that Mr. Chaney is to take charge on January 1, 1928. Mr. Chaney has also bought the telephone plants at Mound Valley and Altamont.

APPLETON CITY, MO.—F. L. House, for 15 years owner and manager of the Appleton City Telephone Exchange, has sold his holdings to the Midwest Telephone Co. The Midwest company recently purchased the Rockville and Schell City exchanges, and will take possession January 1.

BUNCETON, MO.—E. P. Harned of Bunceton recently bought a telephone exchange at Mountain Home, Ark. He has also closed a deal by which he becomes owner of the exchange at Calico Rock, located about 25 miles south of Mountain Home.

HUMANSVILLE, MO.—The recently chartered Osage Valley Telephone Co., which represents a merger of five companies operating in this section, has established its headquarters here, in charge of J. D. Bowlware, general manager.

The five systems represented in the merger are those of Humansville, Flem-

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Boston
Buffalo
Chicago
Cincinnati
Cleveland
Dallas
Detroit
Indianapolis
Kansas City
Los Angeles
Milwaukee
Minneapolis
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Kellogg No. 97 Common battery desk set complete with No. 75 Straight line steel signal sets @	7.50
Stromberg No. 992 type desk set with New Rebuilt 4-bar, 1000, 1600 or 2500 ohm signal set with latest inside wiring @ $9.50—5-bar @	10.00
Western Elec. No. 1020 desk set with New Rebuilt 4-bar, 1000, 1600 or 2500 ohm signal set with latest inside connection wiring @ $10.00—5-bar	10.75
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The stockholders in the new company are S. T. Neil and Guy Schweer, both of Clinton, and J. D. Bowlware, of Humansville. They hold the offices of president, secretary-treasurer and general manager, respectively.

LAWSON, MO.—The Lawson Telephone Co. has been sold to the Middle States Utilities Co. R. R. Coffman will remain temporarily as manager for the new owners.

MARTINSBURG, MO.—R. W. Taylor has completed details of the sale of the Martinsburg and Wellsville telephone exchanges to E. B. Hall of Devon, Kans., and possession was given on December 21. W. W. Tracy, of Eldon, Mo., was the owner since early in the summer.

MARION, OHIO—The Ohio Associated Telephone Co., which has its central office here, has contracted for purchase of the Nevada Telephone Co., in Wyandot county, it was announced recently.

WAKEMAN, OHIO—During a fierce blaze which broke out here December 12, the exchange of the Northern Ohio Telephone Co. was entirely wiped out, entailing a loss of approximately $25,000.

The heroic figure of the fire was the night telephone operator, Miss Maxine Benson, aged 17 years, who stuck at her post until in imminent danger of burning. The fire was discovered about 1:30 a. m. and Miss Benson immediately got in touch with the fire department at Norwalk, about 12 miles west of here, and apparatus was soon on the way. She telephoned the owners of the various stores which were on fire, adjoining the exchange building, and also kept the siren sounding.

GRANFIELD, OKLA. — The Southwest Telephone Co. of Little Rock, Ark., has become owner of the Grandfield Telephone Exchange. This sale places all of the telephone lines and exchanges in Tillman county in the hands of the Southwest company. For the past seven years the Grandfield exchange has belonged to W. P. Misemer.

HOMINY, OKLA.—The Oklahoma Telephone Co., December 1, took charge of telephone exchanges at Kaw City and Apperson. P. W. Bollinger, former owner, will remove to a farm in Kansas. The properties will be operated in connection with other exchanges of the Oklahoma Telephone Co. of which J. W. Walton of Hominy is president.

WAGONER, OKLA.—The Wagoner Telephone Co., which has been owned and operated by E. H. McHenry for the past 18 years, has been sold to the Southwest Telephone Co., with headquarters at Little Rock, Ark.

ODEM, TEXAS—The Odem Telephone Co. changed hands when Mrs. Vernon of Taft bought the exchange, I. T. Watkins, the former owner, having gone to Corpus Christi. Mrs. Vernon has begun a general overhauling and repair, putting in several new lines.

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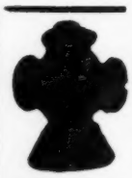
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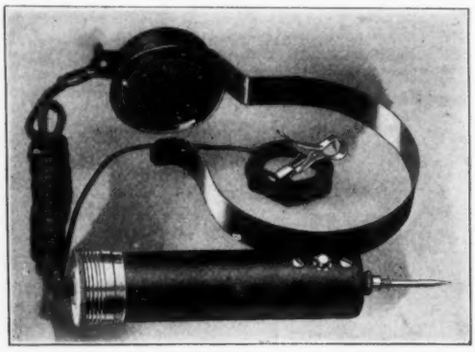

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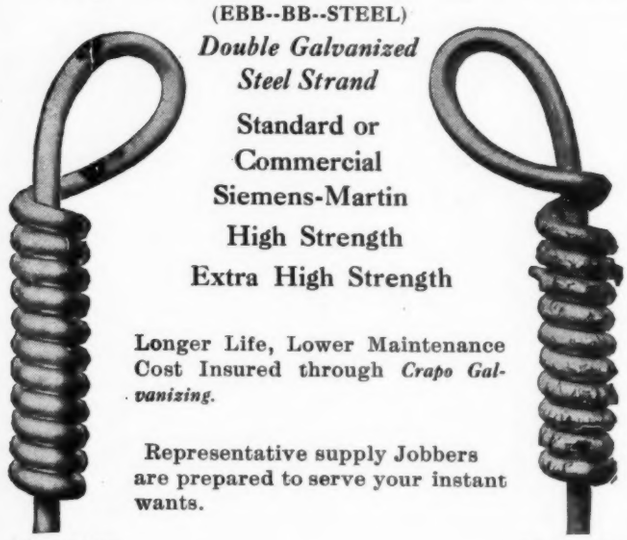

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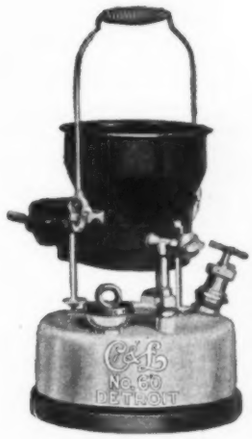
NEW YORK **CHICAGO**



No. 60 with Plumber's Shield
No. 70 with Tinner's Hood

Starts in 90 Seconds

And it will not carbonize or clog even under prolonged use.

Here at last is the firepot every skilled mechanic has been hoping for—

No carbon to cause delay and decrease efficiency.

Quick generating—90 seconds instead of 7 to 9 minutes.

Intense heat, under perfect control—simmer flame or full blast.

No noise—no odor—no smoke.

Operates perfectly anywhere—in any kind of weather.

The most efficient tool that has ever been produced for telephone, telegraph or other similar work.

Get in touch with your supplier at once — or write the factory.

Ask for a demonstration.

Clayton & Lambert Mfg. Co.

6282 Beaubien St. **Detroit, Mich.**

Essentials to

The Stromberg-Ca
No. 896 Magn
Telephones ar
provided with

Phenol Molded Parts
Short Transmitter Arm
Detachable Hookswitch
One Screw Type Ring
Adjustment
Convenient Writing S
High Efficiency, Low
Consumption Trans
Duratex, Brown Silk C
Sensitive Receivers
Powerful Generators
Universal Wiring
Braided Insulation
Durable Finish
Cabled Wiring

Stromberg

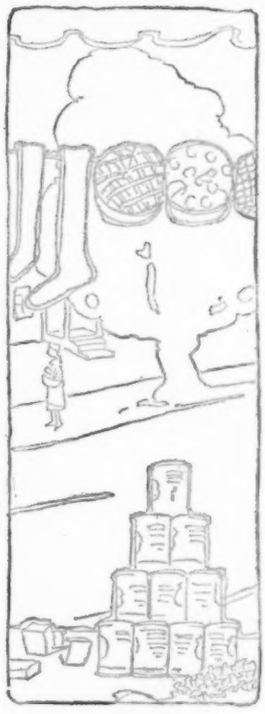
When writing to Stromberg-Carlson Telephone Mfg. Co., please mention TELEPHONY.

Country Life

The days when the rural resident was satisfied to endure inconveniences that his city brother would not even tolerate are long past. Today the country dweller has all the conveniences which are enjoyed in the city.

He is just as particular about his telephone service as the urban subscriber. That is one reason for the popularity of Stromberg-Carlson Magneto Telephones.

But, in addition to pleasing the subscriber, there are many features of Stromberg-Carlson 896 Magneto Telephones which effect economies and conveniences for the operating company, one of which is universal wiring. This permits the carrying in stock of only one type of telephone, because the wiring is all in place for connecting not only to regular bridging service but to any of the following five kinds of service:



Bridging service with full ring condenser
Bridging service with non-interfering push button
Bridging service with silent ring
Bridging service with divided circuit ringing
Bridging service with harmonic ringing

Stromberg-Carlson Magneto Telephones possess many features of interest to operating companies. They are all described in our illustrated bulletin.

Write for Bulletin 109.

Stromberg-Carlson Telephone Mfg. Co.

Factory and General Offices:
ROCHESTER, N. Y., U.S.A.

Branch Offices:
CHICAGO, ILLINOIS KANSAS CITY, MISSOURI TORONTO, CANADA

Coast Representative
..., Young & Co.,
...Francisco, Cal
...Angeles, Cal.
...rtland, Ore.,
...attle, Wash.

Southern Representative
Scoville Mercantile Company,
Atlanta, Ga.

Carlson

A New Year's Greeting —from Kellogg's President

KELLOGG SWITCHBOARD & SUPPLY CO.

1066 W. ADAMS STREET

W. L. JACOBY, PRESIDENT CHICAGO

December 23, 1927.

The end of 1927 finds us filled with enthusiasm for the future.

As an independent operator, we take pleasure in our continued association with the group of Independent Telephone Companies that expects us to lead in the art of telephony.

Kellogg pioneered in the development of accurate transmission of sound, Kellogg has successfully met what was expected of us in scientific and commercial development of radio. It has pioneered again in Program Service by methods unequalled.

With grateful appreciation for business of the past we ask for continuance of your favor and extend to all Best Wishes for the New Year.

Kellogg Switchboard & Supply Co.

W L Jacoby

President.

WLJ*G

Kellogg Switchboard

1020-70 West Adams, Chicago,

Branch Offices and Warehouses:

COLUMBUS, OHIO
163 N. Fourth St.

KANSAS CITY, MISSOURI
308 W. 6th St., Traffic 2 E.

When writing to Kellogg Switchboard & Supply Co., please mention TELEPHONY.

1927—*Was A Great Year*
1928—*Will Be Even Better*
FOR KELLOGG

DURING the past year certain changes have been brought about in the Kellogg organization which place us in a better position than ever before to serve the telephone field. Our manufacturing, sales and service departments were never at so high a state of efficiency.

In addition to our success in the field of telephony, we are proud to say that we have gone far in the development of radio. During the past year our Engineering Department has developed one of the most successful radio receivers on the market. This division of our business is having a splendid growth and we are pleased with the results.

Our plans for 1928 contemplate the maintenance of our position of leadership in the field of Independent Telephony. Also, we have great ambitions for the further development of our radio business.

We are grateful to our many friends who have made it possible for us to look back on 1927 as one of our most successful years.

and Supply Company

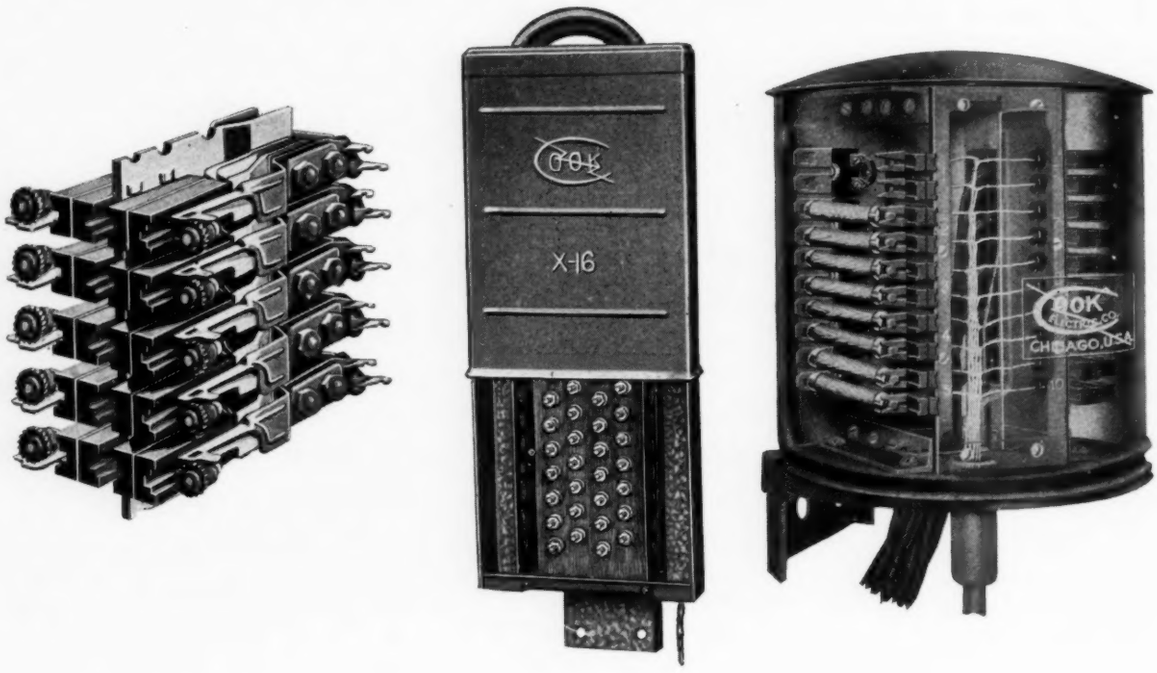
Adams ago, Illinois

Branch Offices and Warehouses:

MISSO TLAND, OREGON
Traffic 2 E. Seventh St.

SAN FRANCISCO, CAL.
1054 Mission St.

When writing to Kellogg Switchboard & Supply Co., please mention TELEPHONY.



The Value of Standardization

During the past quarter of a century we have built up a world wide reputation as manufacturers of the finest "All Steel" Pole Cable Terminals in the world.

The wide use of these terminals has resulted in their adoption as standard by thousands of customers. The demand has forced a production volume which has enabled us to manufacture and sell these quality terminals at very low prices.

So it is with our X Type Terminal, B-7 and B-9 Sub-Station Protectors, and No. 100 Central Office Protectors. Volume production has produced low prices.

We urge our customers to standardize on Cook products and enjoy the benefits of quality products at quantity production prices.

COOK ELECTRIC COMPANY, CHICAGO

2700 Southport Ave. **CHICAGO**

When writing to Cook Electric Co., please mention TELEPHONY.

"COPPERWELD" "Ecco Brand" Insulatek Twisted Pair Drop Wire

has an established reputation as *THE LONG LIFE DROP WIRE*

THE GENUINE HAS THE COPPERWELD TRADEMARK ON TAG ATTACHED TO EVERY COIL

TWISTED PAIR

In order to give satisfaction and long service, the rubber insulation of a drop wire must be able to withstand pressure, shock, friction, heat, cold and dampness—and above all, must be flexible and durable.

For insulating COPPERWELD "Ecco Brand" Insulated Twisted Pair Drop Wire only selected estates plantation rubber, the highest grade obtainable, with reclaimed rubber made from auto tires, and imported dry ingredients, are used.

The conductor is insulated to a definite diameter and covered with a close braid of long fibre cotton, giving maximum protection and wearing qualities to the wire. The braid is saturated with a penetrating wax compound, as a preservative, and covered with a high grade finishing wax which protects against the elements.

Made in accordance with specifications of the foremost engineers—of only high quality materials—protected through all stages of manufacture by rigid tests, COPPERWELD Twisted Pair is a standard quality product with a definite guarantee of performance.

"COPPERWELD"
Products Include
Line Wire
Drop Wire
Ground Rods
Ground Wire Clamps
Cable Rings
Staples, Nails

There never has been nor is there now, any other "copper-covered steel" or "copper-clad steel" made like "COPPERWELD" by the Molten Welding Process.

Copperweld Steel Company

MAIN OFFICE & MILLS:- GLASSPORT, PENNA.
30 CHURCH ST., NEW YORK. 129 S. JEFFERSON ST., CHICAGO.
RIALTO BLDG., SAN FRANCISCO.

Sole Manufacturer

NON-RUSTING "COPPERWELD"

American Electric Company, Inc.

State and 64th Streets

Chicago, U. S. A.

Distributor to the Independent Telephone Trade

When writing to American Elec. Co., Inc., please mention TELEPHONY.

Satisfied Subs
greatest asse

A TYPE of telephon
There is an unders
for the home, the off
type of telephone tha
venient, efficient and

Each plant owner
ard of operation which
Upon this standard d
subscribers and future

These local and commo
by many operating men a
clear crisp transmission ob
and the low battery cons
transmission of the magne
assure you of satisfied subs

Americ

State and 64th Stre

Mona

Branch Office and Wareho

bbers --- Your

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nor very class of service.
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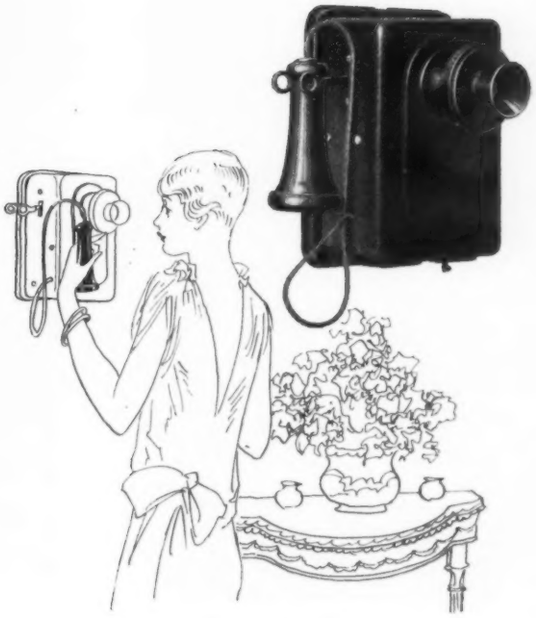
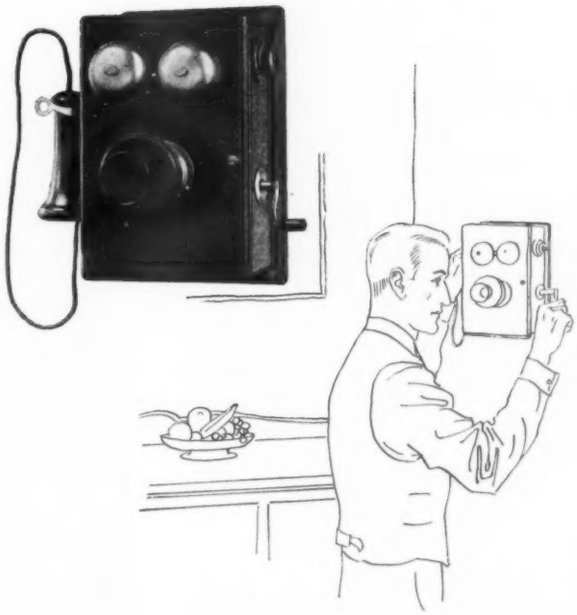


mm telephones have been approved
n ars for every class of service. The
n ob the common battery telephone,
con powerful ring and the quality of
nagne e over long heavily loaded lines
subs r greatest asset.



ameri Company, Inc.

Stre CHICAGO, U. S. A.

siness to
Mona nufacturing Co.
Company
arehou Wyandotte Streets, Kansas City, Mo.

RELIABLE PENCIL FUSES

Add Perfection to Protection

THE MOST ECONOMICAL

They "BLOW RITE" and withstand rough handling

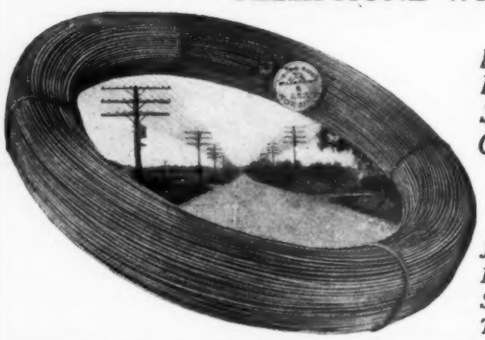
Made in wood, porcelain, fibre or mica to fit all types of protection

Write for our catalog

Reliable Electric Company

3145 Carroll Ave. **Chicago, U. S. A.**

ROEBLING DOUBLE GALVANIZED TELEPHONE WIRE



E. B. B.
B. B.
Steel
Grades

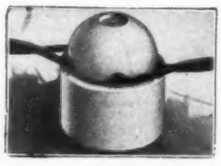
John A. Roebling's Sons Co., Trenton, N.J.

Maintain Winter Service WITH

Ironite

Winter troubles are reduced to a minimum with the use of Ironite. First of all, Ironite conductivity is as fine as can be obtained. And, second, the Insulation that covers the wire is without parallel for strength and toughness. Thirdly, Ironite is economical in its original cost and, what is more, requires no attention or replacements after installation.

Paragon Self-Tying Knobs



Eliminate unsightly brackets and save thirteen cents on every knob installed.

Our nearest office is at your service.

Paragon Electric Co.

39 W. Van Buren Street **Chicago, Ill.**

206 Third Ave., S., Seattle, Wash.
1054 Mission St., San Francisco, Cal.
1612 Maple St., Los Angeles, Cal.
40-42 East 7th St., Portland, Ore.

R. F. DeVoe & Co.

Incorporated

INVESTMENT BANKERS

CONSERVATIVE

TELEPHONE

FINANCING

120 Broadway
New York

Albany **Rochester**

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A Changed Man

Not long ago he was PETER SOUR, with lines down and destroyed.

But now, since using EVER-PROTECT CABLE COMPOUND his lines are insured with a protective coating that's guaranteed to stay. Order from your jobber or direct.

SMILING PETE

National Cable Compound Co.
Incorporated
MITCHELL, INDIANA

THE "STEWART" CABLE TESTER

Locates shorts, crosses, grounds and wet spots to an inch. Will often save its cost on one case of cable trouble.

Order a "STEWART" Cable Tester and be sure you are going to locate your next case of cable trouble quickly.

Any telephone man can use it. Not an instrument that only an expert can use.

Equipped with two vibrators and an indicating lamp.

Write for Circular
Sent on 10-days' trial

STEWART BROTHERS
OTTAWA ILLINOIS
Also Test Sets, Test Cabinets and Detecto-Meters

Note protection at corners

Blake Insulated Staples

Unequaled for telephone and bell wiring. The fibre insulation prevents troublesome short circuits and grounds.

4 Sizes. Pat. Nov. 1900

Write for samples

Blake Signal & Mfg. Co.
BOSTON, MASS.

Northern CEDAR POLES Western
Butt Treating Guaranteed Grades
Bell Lumber Company, Minneapolis, Minn.

Hot Galvanized Pole Line Hardware
M. LANZ BOLT CO. PITTSBURGH, PA.

Northern Western
CEDAR POLES
A full assortment of sizes
Prompt Shipments Assured
T. M. Partridge Lumber Co.
Lumber Exchange MINNEAPOLIS

BUYER'S REFERENCE

Addressing Machines
A1.

Ammeters
G1, W1.

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A7, G1.

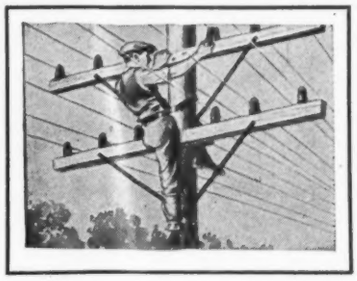
Wire, Rubber Covered
A7, G1, H1, R5, S7.

Wire, Twisted Pair
A5, C11, G1, P2.

Wire, Weatherproof
A4, A5, A7, C11, G1, I1, P3, R3, S7.

Wrench, Pipe Anchor
K4.

The letter with accompanying number indicates the name of advertiser as given in full in the Alphabetical Index to Advertisers. *When making known your wants* to any company listed herein, please mention TELEPHONY.



A Direct Mail Service

FOR those advertisers without agency connections who wish to follow-up their publication announcements by a direct-by-mail campaign, TELEPHONY'S Service Department is equipped to prepare their sales literature.

If the client will advise us as to the size of the folder or circular desired, colors, stock and quantity wished, we will submit for his approval, dummy folder together with prices for the completed job.

Telephone companies wishing to carry-on a similar campaign to reach their subscribers or prospective subscribers are also invited to avail themselves of this service.

For further information write:

SERVICE DEPARTMENT

Telephony Publishing Corporation

608 S. Dearborn Street **Chicago, Illinois**

Subscriber's Service

Probably in almost every issue of Telephony you see certain articles advertised about which you would like further information. At times you hesitate to sit down and write to each manufacturer. This is where Telephony's Service comes in.

Telephony will write the letters for you. All you need do is indicate on the form below just what products you are interested in. Then we will see that you get further information.
In case you want facts about some product or equipment not advertised in Telephony, fill in this information in the second space. Yours for helpful service.

T-13

Subscribers' Service,
Telephony Publishing Corp.,
608 So. Dearborn St., Chicago.

Please advise the firms listed below to send descriptive matter concerning their product as advertised in Telephony.

NAME	ADDRESS	PRODUCT

This is space to use if the product is not advertised in Telephony

NAME	ADDRESS	PRODUCT

Your own name here..... Co.
Title

Address .....
Street City State

International Creosoted Pine Poles have greatest uniform strength, because the average strength of Southern Yellow Pine is not only 44% greater than the nearest other pole species, but the variation in strength of the individual poles from the average is aliso much less.

This combination of greatest average strength, plus most uniform strength, makes the Creosoted Pine Pole the most suitable for line construction. These poles give greatest protection against service interruptions during ice and wind storms.

Illustration shows International Creosoted Pine Poles in service on the Union Pacific

International Creosoting & Construction Co.
General Office—Galveston, Texas
Texarkana—Beaumont—Galveston

2℄7
The International Dating Nail

International
Creosoted Yellow Pine Poles